MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

COURSE CURRICULUM FOR

M.Sc. / M.Engg.

Department of Naval Architecture and Marine Engineering

SUB COMMITTEE FOR SYLLABUS DEVELOPMENT – NAME DEPT, MIST

The Post Graduate (MSc/PhD) course curriculum of the department of Naval Architecture and Marine Engineering (NAME) of Military Institute of Science and Technology (MIST) has been developed by the committee as mentioned below.

A. President

Cdre M Munir Hassan, (E), BN
Head of NAME Department
Military Institute of Science and Technology

B. Internal Members

1. Cdre M Muzibur Rahman, (E), psc, BN
Senior Instructor, NAME Department
Military Institute of Science and Technology

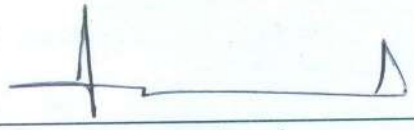
2. Colonel Md Humayun Kabir Bhuiyan, psc, EME
Head, Mechanical Engineering Department
Military Institute of Science and Technology

3. Dr. M Reaz Hasan Khondoker
Professor, NAME Department
Military Institute of Science and Technology

4. Commander Kaosar Rashid, (E), psc, BN
Instructor Class-A, NAME Department
Military Institute of Science and Technology

৪৬তম একাডেমিক কাউন্সিল সভায় সুপারিশকৃত
এবং
৫২তম সিন্ডিকেট সভায় অনুমোদিত হয়।

মোঃ আনোয়ার শফিক
ব্রিগেডিয়ার জেনারেল
কলেজ পরিদর্শক
বাংলাদেশ ইউনিভার্সিটি অব প্রফেশনালস্

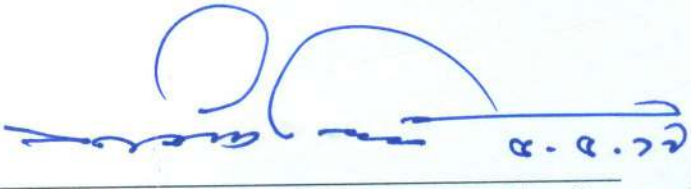
5. 

Dr S M Ikhtiar Mahmud
Associate Professor, NAME Department
Military Institute of Science and Technology

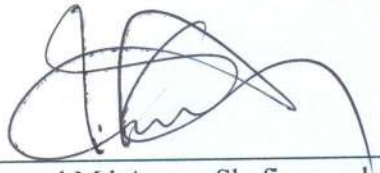
6. 

Md Mezbah Uddin
Assistant Professor, NAME Department
Military Institute of Science and Technology

C. BUP Members

1. 

Cdre Syed Salahuddin Ahmed, (S), NUP, ndu, afwc, psc, BN
Dean Office of the Evaluation, Faculty & Curriculum
Bangladesh University of Professionals (BUP)

2. 

Brg General Md Anwar Shafique, ndc, psc
College Inspector
Bangladesh University of Professionals (BUP)

3. 

Brg General Md Zahidur Rahim, ndc, afwc, psc
Acting Dean, FST
Bangladesh University of Professionals (BUP)

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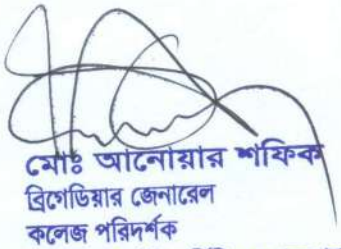

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বাংলাদেশ ইউনিভার্সিটি অব প্রফেশনালস্

D. External Members

1. _____

Dr. Md. Shahjada Tarafder
Professor, Dept of Naval Architecture and Marine Engineering
Bangladesh University of Engineering and Technology

2. _____

Dr. Sheikh Reaz Ahmed
Professor, Dept of Mechanical Engineering
Bangladesh University of Engineering and Technology

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E. Member Secretary

_____

Major Osman M Amin, PhD, Engrs
Instructor Class-B, NAME Department
Military Institute of Science and Technology

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CHAPTER 1

INTRODUCTION TO NAME DEPARTMENT

1.1 General Information

The necessity of establishing a technical institute for Bangladesh Armed Forces was felt in the late eighties. In the absence of such an institution, officers of Bangladesh Armed Forces had been graduating from Bangladesh University of Engineering and Technology (BUET), Bangladesh Institute of Technology (BIT) and other foreign institutions of science and technology. With a view to meet the increasing demand for the development and dissemination of engineering and technological knowhow, Bangladesh Armed Forces established the Military Institute of Science and Technology (MIST) that promises to provide facilities for higher technical education both for the officers of Bangladesh Armed Forces as for civil students from home and abroad. The motto of MIST is Technology for Advancement. Founded on 19 April 1998, MIST started its journey on 31 January 1999 by offering a four-year Bachelor degree on engineering fields. In course of time, Bachelor of Science program on Naval Architecture & Marine Engineering (NAME) is started on 27 January 2013 from 2012-2013 session. By this time, students of two batches have been graduated successfully.

1.2 Department of Naval Architecture and Marine Engineering

1.2.1 Introduction

Our Lord, Almighty, has created human being in a state of weakness, but blessed with extra ordinary divine intelligence and engineers amongst us who could perceive the need of time. In this regard, maritime related engineering is one of the important aspects in the history of civilization and ships are one of the oldest forms of transport used by human being.

Naval architecture has been an inherent part of the evolution of ships or crafts, and naval architecture and marine engineering is a very interesting branch of study. Graduates in this field of study have actually duel degrees. In one way these graduates are naval architects, and another way they are marine engineers. Study in NAME provides insight to design, to build, to operate and to maintain vessels which move just above, on or under the sea. It can be said that naval architects connect nation to nation and civilization to civilization through rivers, seas and oceans. Basically, a good naval architect is he who can acquire required knowledge of designing and building marine vehicles satisfactorily, and utilize such knowledge for the benefit of mankind.

To be prepared for the professional tasks, students of naval architecture are primarily studying hydrodynamic theories and concerned computational methods to develop efficient hull form to be operated at desired movability with minimum energy consumption. Secondly, they have to go through material science in depth to build better quality ships to be sustainable in unfriendly weather conditions at sea. As the field of naval architecture is the part and parcel of mechanical engineering, it is impossible to be a good naval architect without being a good mechanical engineer, and knowledge on mechanics, theory of machine, heat transfer, diesel engine, gas turbine, nuclear power, fuel cells, pumps, compressor, refrigeration, air- conditioning etc is absolutely essential. Moreover, machinery controls, whether it is mechanical, pneumatic or electronic, control engineering expertise for the marine engineers is also required. Above all, today's technology is computer based and no ship is designed without the use of software. It is now the demand of the day to have upper hand on computer programming language and numerical

simulations to bring forward what the graduating students are principally learning in the field of naval architecture and marine engineering. The last but not the least is the humanities and the management for efficient cost estimation, human resource management and enhancement of leadership.

1.2.2 Vision and Mission of NAME Department

Vision: To be national and international center of excellence offering a study programme of high quality, innovation and creativity in the field of Naval Architecture and Marine Engineering.
Mission: To produce engineers and researchers with sound knowledge on fundamentals of traditional, modern and emerging areas of Naval Architecture and Marine Engineering together with innovative design abilities and managerial skills to achieve sustainable national development.

1.2.3 Faculty Member of NAME

A. Military Faculty Members

1. Cdre M Munir Hassan, (E), BN
2. Cdre M Muzibur Rahman, (E), psc,BN
3. Commander Kaosar Rashid, (E), psc, BN
4. Commander M G Mohiuddin, BN
5. Lt Col Muhammad Rabiul Islam, PhD, EME
6. Major Osman M Amin, PhD, Engrs

B. Civil Faculty Members

1. Professor Dr. M Reaz Hasan Khadakar
2. Asst Professor Dr. S M Ikhtiar Mahmud
3. Asst Professor Md. Mezbah Uddin
4. Lec Rajia Sultana Kamol
5. Lec Abu Afree Andalib
6. Lec Nafisha Nubayaatt Haq
7. Lec Daluar Hussain
8. Lec Md Towhidur Rahman
9. Lec Kazi Rafi Rahaman
10. Lec Sanbera Islam Piuly
11. Lec Tasmia Hoque

C. Guest Faculty Members

1. Professor Dr. S Reaz Ahmed
2. Professor Dr. Md. Rafiqul Islam
3. Professor Dr. Md. Shahjada Tarafder
4. Professor Dr. Md. Goutam Kumar Saha
5. Assoc Professor Dr. Md. Mashiur Rahaman

1.2.4 Facilities of the Department

The NAME department endeavors to provide its faculty members and students adequate laboratory, library and other facilities to undertake undergraduate courses. Since the engineering education is laboratory intensive, following laboratories are catered for such requirements:

(1) Computer Aided Ship Design Lab

(2) Ships Structure and Fabrication Lab

(3) Marine Machinery Lab

(4) Ship Instrument Lab

(5) Damage Control Fire Fighting and Life Saving Lab

(6) Ship Propulsion Lab

(7) Ship Resistance Lab

(8) Machine Tools Lab

(9) Model Fabrications Lab

(10) Towing tank stability Lab

(11) Marine Transportation Lab

(12) Hydrodynamics Lab

(13) Auxiliary Machinery Lab

(14) Marine Electronics Lab

In addition to above laboratories, NAME students will have the access to the laboratories/workshops held in Physics, Chemistry, Mechanical Engineering, Electrical Engineering and Civil Engineering departments too during their project, thesis and research works. Besides, NAME department has established "Ship Design and Marine Structural Solution Center" to take the challenge of professional engineering to an eminent level.

CHAPTER 2

RULES AND REGULATIONS FOR MASTERS DEGREE

2.1 Degrees Offered

The Masters degrees to be offered under the Post-Graduation Ordinance of MIST in NAME Department are as follows:

2.1.1	**Master of Science in**	
Naval Architecture and Marine Engineering, Abbreviated as		M.Sc. Engg. (NAME)
2.1.2	**Master of Engineering in**	
Naval Architecture and Marine Engineering, Abbreviated as		M. Engg. (NAME)

2.2 Admission Requirements

2.2.1 For admission to the courses leading to a Master's degree (M.Sc. Engg. / M. Engg.) an applicant:

(a) Must have a minimum GPA of 4.00 out of 5.00 or a first division or equivalent in S. S. C and H. S. C or in equivalent examinations;

(b) Must have obtained a B.Sc. Engg. Degree in Naval Architecture & Marine Engineering or related equivalent engineering degree from any UGC recognized university/institution. The duration of B. Sc. Engg. or equivalent degree program should be of minimum four (04) years, and the applicant must have at least 55% marks or a minimum GPA of 2.75 out of 4.0 or its equivalent in the under-graduation programme;

(c) In case of different grading system, the GPA of all the above examinations should be evaluated by the MIST Equivalence Committee.

(d) In case of difference in the under-graduation degree, the applicant may require to undertake prerequisite theory course(s) as allocated by the BPGS of NAME department to achieve the equivalency amongst the candidates.

2.2.2 For admission to the courses leading to the degree of M.Sc. Engg. /M.Engg. in any branch, an applicant must have obtained a B.Sc. Engg. Degree in the relevant branch or an equivalent degree from any UGC recognized institution. For the case of non-relevant degree of a department, the candidate may be required to undertake prerequisite courses as determined by the BPGS of that department.

2.3 Admission and Registration Procedures

2.3.1 Applications for admission to the above programmes shall be invited through regular means of advertisement and shall be received by the Admission officer.

2.3.2 Before being finally selected for admission, an applicant may be required to appear at an oral and/or written test by a Selection Committee as constituted by the concerned department. Every selected applicant, unless he/she has already been registered, shall get himself/herself registered with Bangladesh University of Professionals (BUP).

2.3.3 After admission each student shall be assigned, by the Head of the department, an Adviser from among the teachers of the Department not below the rank of an Associate Professor/Instructor Class A. In advance of each enrolment and registration, the Adviser shall check and approve his/her student's schedule for subjects, pre-requisites as recommended by the Selection Committee and the total hours. The student is expected to consult his/her Adviser on all academic matters but, it is the responsibility of the individual student to see that his/her schedule conforms to the academic regulations. If no advisor is assigned, then the student will contact with the Postgraduate Program Coordinator or Head of the department for all academic matters.

2.3.4 Every registered student shall get himself/herself enrolled on payment of prescribed fees and other dues as per MIST and BUP rules before commencement of each semester.

2.3.5 On the recommendation of the Board of Post Graduate Studies (BPGS) and Committee for Advanced Studies and Research (CASR), the rules for admission into the post graduate studies shall be framed from time to time by the Academic Council. CASR on its own may, if it deems fit, recommend such rules for admission for approval of the Academic Council. The composition of BPGS and CASR is mentioned in page 4 of this ordinance.

2.3.6 No late registration will be allowed after two weeks of designated dates of registration. Late registration after this date may only be accepted for thesis/project if the student submits a written appeal to the Dean, MIST through the concerned Head and can document extenuating circumstances such as medical problems (physically incapacitated and not able to be presented) from the Medical Officer (MO) of the Institute or some other

academic commitments which precluded registration prior to the last date of registration. Students will be charged a late registration fee of Tk. 1000.00 (One thousand) only. This extra fee will not be waived whatever be the reason for late registration.

2.3.7 If a student is unable to complete the final examination of a semester due to serious illness or serious accident or official commitment he/she may apply to the Dean, MIST in a prescribed form through Head/Director of the Department for total withdrawal from the semester within a week after the end of the semester final examination. The application must be supported by a medical certificate from the MO, or relevant Official documents. The Academic Council will take the final decision about such application on the recommendation of the relevant BPGS.

2.4. Supervisor

2.4.1 Criteria of supervisor selection

On admission and fulfillment of other requirements as mentioned in this ordinance, the Head or Postgraduate Program Coordinator of the relevant department will suggest a Supervisor for the student after completion of at least 60% theory courses with minimum required CGPA (for MSc: 3.00 and for MEngg: 2.75) following the format as given in Annexure-1. Without taking supervisor a student is not allowed to register credit hours for thesis/project. The criteria of supervisor are as follows:

2.4.1.1 He/She must have a PhD degree in a relevant discipline from any public university of Bangladesh/renowned foreign university.

2.4.1.2 Scrutinising of the PhD degree has to be done through a committee as comprised below before selection as a supervisor:
- Head of the concern department
- One teacher from MIST
- One external member

2.4.1.3 He/She should have at least 01 years of postgraduate teaching and supervising experience or 02 years of research experience from any public university or from national/internationally renowned research organization.

2.4.1.4 Any person who has online PhD will not be appointed as supervisor.

2.4.1.5 Any person who fulfills above criteria and preferably has 02 publications in reputed peer reviewed journals as a First/Corresponding author will be appointed as a supervisor.

2.4.1.6 The institute may outsource supervisors primarily from public university on fulfillment of above criteria. However, a retired teacher of public university presently serving in any other organization/university may be permitted to supervise on fulfillment of above criteria.

2.4.1.7 The BPGS will look into the fulfillment of the above criteria before appointing supervisors. Approval of CASR for appointing supervisor must be taken.

2.4.1.8 If supervisor is selected outside of this institute, CASR through BPGS may decide whether a co-supervisor from MIST is required or not.

2.4.1.9 If co-supervisor is required for a particular thesis work, the co-supervisor preferably should have a PhD degree from reputed university, however, a faculty member holding MSc (with thesis) degree can work as a co-supervisor.

2.4.1.10 For MEngg projects a faculty member holding MSc (with thesis) degree with at least 02 years of teaching and/or research experience may be permitted to supervise.

2.4.1.11 A supervisor/co-supervisor shall not take more than 12 (twelve) students (maximum 6 as supervisor and remaining 6 as co-supervisor) of two programs ie Masters and PhD at a time. However, in any cases he/she will not allow to take more than 2 (two) PhD students at a time.

2.4.1.12 Any change of supervisor/co-supervisor shall have to be recommended by the CASR through BPGS. In such case, written consent of both present and proposed supervisor/co-supervisor has to be produced.

2.4.2 Charter of Duties of a Supervisor

The supervisor is expected to do the following:

2.4.2.1 Supervise the research work of the M. Sc. Engg./M.Engg. researcher.

2.4.2.2 Supervise the research for the duration of researcher's candidacy, which may include a period of extension to the researcher's submission deadline and may also include supervision during a period of resubmission.

2.4.2.3 Ensure face-to-face meeting with the Researcher's at least once in a month.

2.4.2.4 Ensure communication with Researcher at least once in a week by any means (i.e., telephone, email etc.)

2.4.2.5 Submit Research Progress Report to the Head of the respective department covering duration of three calendar months as specified in the Academic Calendar.

2.4.2.6 Examine the thesis as a member of Board of Examiners.

2.4.2.7 Attend the oral examination of the researcher for defense.

2.4.2.8 Maintain a comprehensive file of relevant documents, emails, correspondence etc.

relating to supervision of the candidate.

2.4.2.9 If under any emergency circumstance such as going abroad for higher studies etc. he/she must inform the Dean/Head of the department at least one month prior to the discontinuation.

2.5 Academic Requirements and Regulations

2.5.1 The minimum duration of the M.Sc.Engg./M.Engg. program shall be three semesters. A student for the Master's degree program must complete all the requirements for the degree within five academic years from the date of the first admission in the respective programme.

2.5.2 Academic progress shall be measured in terms of Credit hours earned by a student. One Credit hour subject shall normally require 14 hours of lecture for one semester (14 weeks); while one Credit hour for thesis/project work should normally require 42 hours of research work for one semester. The number of Credit hours for each subject shall be as specified in the syllabus of the respective department.

2.5.3 A student must complete a minimum of **36 credit hours** of which **18 credit hours** shall be assigned for a thesis for M.Sc.Engg. and **6 credit hours** as project work for M.Engg. Students can register thesis/project after completion of at least 12 credit hours theory courses.

2.5.3.1 Students are allowed to take more credit courses than minimum requirement for the calculation of GPA. The extra course should help the student to increase his/her CGPA than minimum requirement, and also in case Supervisor wants him/her to take addition courses related to his/her thesis work. However, the students need to take written permission for the extra courses from Supervisor and Head of the concern department. This has to be reported to the Controller of Examination of BUP through Controller of Examination of MIST.

2.5.3.2 The best grades among all the completed courses will be considered for CGPA calculation.

2.5.4 There shall be two categories of students, namely, full-time students and part-time students.

2.5.4.1 A student may enroll as a part-time student. Students, serving in different organizations, may also be admitted as part time students with the written consent of the employer. A part time student may be assigned a maximum of 9 credit hours of course including thesis work in any semester.

2.5.4.2 Full-time students must register for a minimum of 12 credit hours and a maximum of 15 credit hours per semester. A full-time student shall not be allowed to be in the employment of any organization (even as a part-time employee). However, they may be employed as Teaching/Research Assistant at MIST. If a full time student becomes an employee (full time or part time) of any other organization in the middle of a semester, he/she may, with the approval of the Head of the Department and his/her Employer, be allowed to continue as a full time student for that semester only.

2.5.4.3 A student may be allowed to switch from part-time to full-time or vice versa on the recommendation of the respective BPGS before the commencement of a semester.

2.5.5 The subjects of study in the different Departments/Institutes shall be as recommended by the respective BPGS and the Faculty and approved by CASR. The BPGS may review the curriculum from time to time and recommend any changes as may be considered necessary. At least 60% of the theory courses have to be completed from their major field of study.

5.6 A student on the recommendation of the BPGS and as approved by the CASR may be allowed to transfer a maximum of 9.0 credits of the courses (relevant to the field of study) completed by the student at a recognized institution provided that the courses were not taken earlier than five calendar years from the date of his/her first enrolment in the respective programme at MIST and that the student obtained a minimum GPA of 3.0 out of 4.0 or its equivalent in such courses and that the courses are equivalent to the approved courses of MIST.

কাজী ওমর বায়েজীদ
মেজর
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বাংলাদেশ ইউনিভার্সিটি অব প্রফেশনালস্
মিরপুর সেনানিবাস, ঢাকা-১২১৬

2.6 Grading system

2.6.1 Final grades for courses shall be recorded as follows:

Grade	Merit description	Grade points
A (Plus)	Excellent	4.00
A	Very good	3.50
B (Plus)	Good	3.00
B	Average	2.50
C	Pass	2.00
F	Fail	0.00
S	Satisfactory	--
U	Unsatisfactory	--
W	Withdrawn	--
X	In Progress (for thesis)	--
I	Incomplete/Discontinued (for thesis)	--

Note: For already enrolled students the previously approved grading system will be followed till his/her completion of the degree.

2.6.2 Courses in which the student gets F grades shall not be counted towards credit hour requirements and for the calculation of Grade Point Average (GPA).

2.6.2.1 The C grades, up to a maximum of two courses, may be ignored for calculation of GPA at the written request of the student to the Head of the Department on the recommendation of the supervisor / program coordinator, provided that the student has fulfilled the total course credit hour requirement in the remaining subjects with a minimum CGPA of 3.00 (for M.Sc. Engg.) and 2.75 (for M.Engg.).

2.6.2.2 When a course is repeated for improvement, better grade shall be counted for calculation of GPA.

2.6.2.3 Performance in all the subjects excluding all the F grades shall be reflected in the transcript.

2.6.3 Grade "I" is given only when a student is unable to sit for the examination of a course at the end of the semester because of circumstances beyond his/her control. He/She must apply to the Head of the Department within one month after the examination to get an "I" grade in that course. It must be completed as soon as possible whenever the course is offered, otherwise, the "I" becomes an "F" grade. He/She may, however, be allowed to register without further payment of tuition fees for that course. If the course is not offered within next one year, the student can complete the course requirement by taking similar alternative course which should be approved by the BPGS.

2.6.4 Satisfactory or Unsatisfactory used only as final grades for thesis/project and non-credit courses. An "X" grade shall be recorded for thesis in progress. If, however, thesis is discontinued an "I" grade shall be recorded.

2.6.5 Students may enroll for non-credit course(s) termed as audit/research course(s) on recommendation of his/her thesis / project Supervisor and Head of the Department. However, his grades in audit/research course(s) will not be counted for calculating his CGPA.

2.6.6 A student shall withdraw officially from a course within two working weeks of the commencement of the semester or else his grade in that course shall be recorded as F unless

he/she is eligible to get a grade of "I". A student may be permitted to withdraw and change his/her course within the specified period with the approval of his/her Adviser, Head of the Department and the respective teacher(s) concerned. (In that case his / her grade in the courses registered shall be recorded as 'W' in his Academic Record but shall not be reflected in the transcript.)

2.6.7 Numerical markings may be made in answer scripts, tests etc., but all final grading to be reported to the Controller of Examinations (BUP) shall be in the letter grade system as detailed below:

90% and above	:	A (Plus)
80% to below 90%	:	A
70% to below 80%	:	B (Plus)
60% to below 70%	:	B
50% to below 60%	:	C
Below 50%	:	F

2.7 Research Proposal

All students must submit a research proposal following the format given in Annexure-3 (for M.Sc. Engg.) or Annexure-5 (for M.Engg.) to the BPGS of the respective department which shall examine the proposal and recommend it for the approval of the CASR. In special circumstances the BPGS may recommend to CASR for approval of any subsequent changes in the research proposal.

2.8 Conduct of Examination

2.8.1 In addition to tests, assignments and/ or examinations during the semester as may be given by the teacher(s) concerned, there shall be a written examination and / or other tests for each of the subjects offered in a semester at the end of that semester, the dates of which shall be announced by the Exam Section, MIST as advised by Dean at least two weeks before the commencement of the examination. The final grade in a subject shall be based on the performance in all tests, assignments and examinations.

2.8.2 The Exam Section and BUP shall keep up to date record of all the grades obtained by a student in individual Academic Record Card. Grades shall be announced by the Controller

of Examinations at the end of each semester. In addition, each student is entitled to one official transcript of the University record at the completion of his academic programme from the office of the Controller of Examinations on production of statement of clearance from all departments' offices.

2.8.3 The Head /BPGS of a department shall recommend the names of the paper setters and examiners for the semester examinations at least four weeks before the date of commencement of the examination to the Controller of Exam of MIST for approval.

2.9 Qualifying Requirements

The following are the qualifying requirements for the degree of M.Sc. Engg./M. Engg:

9.1 To qualify for the degree a student must earn a minimum grade point of 3.00 for M.Sc. Engg and 2.75 for M.Engg based on the weighted average of grade points (GP) in his/her course work.

2.9.1.1 Two courses may be repeated for improvement with the prior approval of the Head of the Department on the recommendation of the Supervisor/Program Coordinator. Such approval shall be reported to the BPGS.

2.9.1.2 A student obtaining "F" grade in a course may be allowed to repeat the course with the prior approval of Head of the Department on the recommendation of the Supervisor / Advisor. Such approval shall be reported to the BPGS.

2.9.1.3 A student is allowed to switch from M.Sc. Engg. to M.Engg. if his/her CGPA falls below the minimum requirement of the M.Sc. Engg. degree. This has to be approved by the respective BPGS on the written request from the student.

2.9.2 A student shall not be allowed to continue the programme if he/she obtains a total of three "F" grades in one or more than one subjects, during the whole course of his/her studies.

2.9.3 If at the end of the second or any subsequent semester (for full time students) and third or any subsequent semester (for part time students), the cumulative GPA falls below 3.00 for a M.Sc. Engg. student and 2.75 for a M.Engg. student he/she shall not be allowed to continue in the programme.

2.10 Thesis

2.10.1 A M.Sc. Engg. student finally shall submit a thesis on his/her research work fulfilling the other requirements mentioning in this Ordinance.

2.10.2 Research work for the thesis shall be carried out under the supervision of a Supervisor and a Co-supervisor (if required).

2.10.3 If any change is necessary of the approved thesis (title, content, cost, Supervisor, Co-supervisor etc.), it shall be approved by the CASR on recommendation of the relevant BPGS.

2.10.4 The research work must be carried out in MIST or at a place(s) recommended by the BPGS. The work schedule and financial involvement should be mentioned in the research proposal for carrying out the research work.

2.10.5 At the end of the student's research work, the student shall submit a thesis which must be an original contribution to engineering/sciences and worthy of publication.

2.10.6 The thesis submitted for the fulfillment of the degree of M.Sc. Engg. shall be written in English. The student must follow the Thesis writing guideline attached to this ordinance.

2.10.7 The student shall certify that the research work was done by him/her and that this work has not been submitted elsewhere for the award of any other diploma or degree (except for publication).

2.11 Examination of Thesis

2.11.1 Examination Board

2.11.1.1 An Examination Board for every student for thesis and oral examination shall be approved by the CASR through BPGS on recommendation of the thesis Supervisor in consultation with the Head of the Department. The Board shall consist of at least four

members including the Supervisor as the Chairman and the Head of the Department as an Ex-officio and following the format as given in Annexure-4. The Board shall also include one or more external examiner(s).

The Examination Board shall be constituted as follows:		
(i)	Supervisor	Chairman
(ii)	Co-supervisor (if any)	Member
(iii)	Head of the Department (Ex-officio)	Member
(iv)	One or more members from within the Department/Institute	Member
(v)	One or more external member from any other reputed National/International Institutes/Universities/Organizations	Member (External)

If any member holds two portfolios (i.e., Head of a Department becomes Supervisor), then one additional internal member can be included in the board. In any case if Head of a department is unable to act as an Ex-officio, then the Faculty Dean will act as an Ex-officio. In case of non-availability of an internal member in related field, one additional external member can be included in the board from any reputed public university.

2.11.1.2 All the members of the Thesis Examination Board should be PhD holder and should have expertise on the same field of study of the student. They should have experience of supervision and/or thesis examination of Masters Candidates.

2.11.1.3 If the external examiner is appointed from outside the country a copy of the thesis should be sent for his/her evaluation and his/her written opinions are to be placed before the Examination Board.

2.11.1.4 If any examiner is unable to accept the appointment or has to relinquish his/her appointment before the examination, Commandant, MIST shall appoint another examiner in his/her place, on suggestion from the Supervisor in consultation with the Head of the department. This appointment will be reported to the CASR.

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2.11.2 Thesis Examination

2.11.2.1 Every student submitting a thesis in partial fulfillment of the requirements of a degree, shall be required to appear at an oral examination, on a date fixed by the Supervisor in

consultation with the Head of the Department and must satisfy the examiners that he/she is capable of intelligently applying the results of this research to the solution of problems, of undertaking independent work, and also afford evidence of satisfactory knowledge related to the theory and technique used in his/her research work.

2.11.2.2 Every student shall submit to the Head of the Department, through his/her Supervisor, required number of type written soft bound copies of his/her thesis in the approved format (as given in Annexure-7) on or before a date to be fixed by the Supervisor in consultation with the Head of the Department along with transcript of the course work and copy/copies of published article.

2.11.2.3 After necessary scrutiny, the Head will forward the thesis with other documents (transcripts, published articles) to the member of the Examination Board.

2.11.2.4 The M.Sc. Engg. Thesis shall be examined by all members of the Examination Board. After examination of the thesis, all members shall send their reports within 2 weeks after receiving the soft bound thesis in a sealed envelope to the Head of the concerned department and a copy to the Controller of Examination of MIST.

2.11.2.5 On the basis of positive opinions from majority of the examiners except Supervisor and Co-supervisor that satisfies the thesis is standard and justified for Oral Examination, the Ex-officio of the Thesis Examination Board in consultation with the Supervisor shall arrange an Oral Examination for the M.Sc. Engg. student to defend his/her Thesis.

2.11.2.6 If any external examiner is appointed from outside the country, he/she shall be invited for attending the Oral Examination. In case, he/she is unable to attend the oral examination, the oral examination shall be arranged in absence of him/her, provided he/she gives his/her consent to do so.

2.11.2.7 On the basis of the negative opinions from majority of the examiners except Supervisor and Co-supervisor that do not satisfy the thesis as standard, the Thesis Examination Board shall decide either to reject the thesis or may recommend to allow the student to resubmit the thesis after necessary revision and modification as suggested by the examiners within 6 (six) months from the date of supply of comments of examiner. In such case, further registration will not be necessary. The Ex-officio of the thesis Examination Board shall report their decision to the Controller of Examinations of this Institute.

2.11.2.8 In case equal numbers of examiners are in favour and against, the Ex-officio will propose and get approval from CASR for a third external examiner on the relevant field and take his opinion whether the student will be allowed for Oral examination or reject/resubmit the thesis. For unavoidable circumstances, Commandant may give approval of the third external examiner which has to be post facto approved in the next CASR meeting.

2.11.2.9 In case, the student is unable to satisfy the Oral examination even the thesis is adjudged adequate, the Thesis Examination Board may recommend that the M.Sc. Engg. student may be permitted to appear at another oral examination on a date to be fixed by the Supervisor in consultation with the Head of the Department.

2.11.2.10 After successful Oral examination and necessary corrections recommended by the thesis Examination Board, every candidate will submit necessary copies of hard bound thesis following the template to the concern persons/department.

2.11.2.11 The Thesis Examination Board will forward the results of the M.Sc. Engg. student to Controller of Examinations of MIST. The results will be send to the Controller of Examination of BUP for approval and then the degree will be awarded.

2.12. Project

2.12.1 A M.Engg student finally shall submit a project report on his/her research work fulfilling the other requirements mentioning in this Ordinance.

2.12.2 Research work for the report shall be carried out under the supervision of a Supervisor.

2.12.3 If any change is necessary of the approved project (title, content, cost, Supervisor etc.), it shall be approved by the CASR on recommendation of the relevant BPGS.

2.12.4 The research work must be carried out in MIST or at a place(s) recommended by the BPGS. The work schedule and financial involvement should be mentioned in the research proposal for carrying out research work.

2.12.5 At the end of the student's research work, the student shall submit a project report which must be an original contribution to engineering/sciences.

2.12.6 The report submitted for the fulfillment of the degree of M.Engg. shall be written in English. The student must follow the writing guideline attached to this ordinance.

12.7 The student shall certify that the research work was done by him/her and that this work has not been submitted elsewhere for the award of any other diploma or degree (except for publication).

2.12.8 Examination Board-Project

2.12.8.1 An Examination Board for every student for his/her project and oral examination shall be approved by the CASR on recommendation of the thesis Supervisor in consultation with the Head of the Department. The Board shall consist of at least three members including the Supervisor as the Chairman following the format as given in Annexure-6. The Supervisor shall act as the Chairman and propose the other board members.

The Examination Board shall be constituted as follows:

(i)	Supervisor	Chairman
(ii)	One or two member from within the Department/Institute	Member
(iii)	One external member from any other reputed National Institutes/Universities/Organizations	Member (External)

If any member holds two portfolios (i.e., Head of a Department becomes Supervisor), then one additional internal member can be included in the board. In case of non-availability of an internal member in related field, one additional external member can be included in the board from any reputed public university.

2.12.8.2 All the members of the Project Examination Board should be at least Masters degree holder and have expertise on the same field of study of the student. They should have experience of supervision and/or thesis examination of Masters Students.

2.12.8.3 If any examiner is unable to accept the appointment or has to relinquish his/her appointment before the examination the BPGS shall appoint another examiner in his/her place on the recommendation of his/her supervisor. This modification will be reported to the CASR.

2.12.8.4 Every student shall submit to the Head of the Department, through his/her Supervisor, required number of type written soft bound copies of his/her project report in the approved format (as given in Annexure-7) on or before a date to be fixed by the Supervisor concerned in consultation with the Head of the Department along with transcript of the course work and copy/copies of published article (if any).

2.12.8.5 After necessary scrutiny, the Head will forward the project report with other documents to the members of the Examination Board at least 2 weeks before the oral examination. The report shall be examined by all members of the Examination Board.

2.12.8.6 Every student submitting a project report in partial fulfillment of the requirements of a degree, must be required to appear at an oral examination, on a date or dates fixed by the Supervisor concerned in consultation with the Head of the Department and must satisfy the examiners that he/she has gained satisfactory knowledge related to the project work.

2.12.8.7 In case a student fails to satisfy the Examination Board by project report and /or oral examination, the student shall be given one more chance to resubmit the project report and/or appear in another oral examination as recommended by the Board.

2.12.8.8 After successful Oral examination and necessary corrections recommended by the Project Examination Board, every candidate will submit necessary copies of hard bound project report following the template given in Annexure-7.

2.12.8.9 The Project Examination Board will forward the results of the M.Engg student to Controller of Examinations of MIST through Graduate Course Coordinator. The results will be send to the Controller of Examination of BUP for approval and then degree will be awarded.

2.13 Striking off and Removal of Names

2.13.1 The name of the student shall be struck off and / or removed from the rolls of the Institute on the following grounds:

(i) Non-payment of dues within prescribed period. Post graduate students residing in the halls of residence shall be subject to the same conditions as allowed in the Policies Relating to the Hall of Residence and Discipline.

(ii) Failing to make satisfactory progress in his/her programme as reported by the supervisor through the BPGS and approved by CASR.

(iii) Forced to discontinue his/her studies under disciplinary rules.

(iv) Withdrawn officially from the Master Degree Programme.

2.14Academic fees

Items of Academic fees shall be as per MIST policy, and these fees shall be reviewed and recommended from time to time by the Governing Body of MIST

ANNEXURE – 1

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY, DHAKA
OFFICE OF THE MEMBER SECRETARY OF THE COMMITTEE FOR ADVANCED STUDIES AND RESEARCH

Application for the **Approval of Supervisor and/or Co-Supervisor** for Ph.D./ M.Phil./ M.Sc.Engg./ M.Engg. Thesis/Project

(All the items/sub-items of the following list that are applicable to ones must be mentioned and filled in properly)

Date of Application:

1. **Name of the Student:** **Status:** Full Time/ Part Time
   Roll No: **Session:** Apr.20..../Oct.20.....
2. **Present Address:**
   Email: Tel No:
3. **Name of the Department:**
   Program (Ph.D./M.Phil./M.Sc.Engg./M.Engg.): Division (if any):
4. **Session of First Enrolment in the Program:**
5. **Name of the Supervisor:** Affiliation:

Email: Tel No:

6. **Name of the Co-Supervisor** (if any)**:** Affiliation:
7. **List of Courses so far Completed with Course No, Course Title, Credit Hour, Grade, Grade Point and CGPA:***(To be verified and signed by the Program Coordinator)*

Sl. No	Course No	Course Title	Credit	Grade	Grade Point	CGPA

Signature of the Program Coordinator
Date:

8. **Number of Postgraduate Students Working with the Supervisor at Present:**

Ph.D.: M.Phil./ M.Sc.Engg.: M.Engg.:

9. **BPGS Reference**: Date of BPGS Meeting:

Signature of the Student
Date:

Signature of the Supervisor
Date:

Signature of the Co-Supervisor
Date:

Signature of the Head of the Dept.
Date:

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ANNEXURE – 2

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY, DHAKA
OFFICE OF THE MEMBER SECRETARY OF THE COMMITTEE FOR ADVANCED STUDIES AND RESEARCH
Application for the **Approval of Doctoral Committee**

(All the items/sub-items of the following list that are applicable to ones must be mentioned and filled in properly)

Date of Application:

1. **Name of the Student:** **Status**: Full Time / Part Time

   Roll No: Session: Apr. 20…. / Oct. 20….

2. **Present Address:**

   Email: Tel No:

3. **Name of the Department:**

   Program (Ph.D./M.Phil./M.Sc.Engg./M.Engg.): Division (if any):

4. **Session of First Enrolment in the PhD Program:**

5. **Appointment of Supervisor & Co-supervisor Approved by CASR** (if any)**:**

Meeting No: Date:

6. **Name of the Supervisor**: Affiliation:

Email: Tel No:

7. **Name of the Co-supervisor (if any):** Affiliation:

8. **Tentative Title of Thesis:**

9. BPGS Reference: Date of BPGS Meeting:

Signature of the Student:

Date:

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To be filled in by the Head of the Department and Supervisor

10. Proposed Doctoral Committee:

(i) **Name:** Designation: Affiliation:	(Supervisor)	**Chairman**
(ii) **Name:** Designation: Affiliation:	(Co-Supervisor, if any)	**Member**
(iii) **Name** (Head of the Dept.)**:** Designation: Affiliation:	(Ex-Officio)	**Member**
(iv) **Name:** Designation: Affiliation:		**Member**
(v) **Name:** Designation: Affiliation:		**Member**
(vi) **Name:** Designation: Affiliation:		**Member**
(vii) **Name:** Designation: Affiliation:		**Member**

Signature of the Supervisor:

Date:

Signature of the Head of the Dept.:

Date:

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মিরপুর সেনানিবাস, ঢাকা-১২১৬

ANNEXURE – 3

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY, DHAKA
OFFICE OF THE MEMBER SECRETARY OF THE COMMITTEE FOR ADVANCED STUDIES AND RESEARCH

Application for the **Approval of Ph.D. Thesis Proposal**

(All the items/sub-items of the following list that are applicable to ones must be mentioned and filled in properly)

Date of Application:

1. **Name of the Student:** **Status:** Full Time/ Part Time

   Roll No: **Session:** Apr. 20…. / Oct. 20….

2. **Present Address:**

   Email: Tel No:

3. **Name of the Department:**

   Program (Ph.D./M.Phil./M.Sc.Engg./M.Engg.): Division (if any):

4. **Session of First Enrolment in the Program:**

5. **Name of the Supervisor:**

Affiliation:

Email: Tel No:

6. **Name of the Co-Supervisor** (if any)**:** Affiliation:
7. **Thesis Title** (IN BLOCK LETTER)**:**

8. **Background and Present State of the Problem:** *(Not more than 150 words)*

Please mention only those activities which have been carried out in different places as reported in publications. Please support your information by citing the relevant references. Keep your description within 150 words.

9. Objectives with Specific Aims and Possible Outcome: *(Not more than 150 words)*

Please list the objectives and the possible outcomes using short sentences. If you are writing one or two paragraphs for describing the objectives and the outcomes please limit yourself within 150 words.

10. Outline of Methodology/Experimental Design: *(Not more than 200 words)*

Outline the approach and the sequence of activities in not more than 200 works to describe how the work will be carried out.

11. References:

Give only the references which you have indicated as number style (i.e., [1] or [1-3] etc.) in the item 8 (background and present state of the problem). While giving the references you must mention clearly the name of author(s), title of the paper/book/dissertation, name of the journal/proceeding/publisher/university, vol. no., year of publication etc. in chronological order.

12. **List of Courses so far Completed with Course No, Course Title, Credit Hour, Grade, Grade Point and CGPA:** *(To be verified and signed by the Program Coordinator)*

Sl. No.	Course No	Course Title	Credit	Grade	Grade Point	CGPA

Signature of the Program Coordinator:

Date:

13. **Cost Estimate:** (*Break-ups can be provided in separate sheets, if required*)

Sl. No.	Items	Cost (Tk.)
1	Cost of Material (breakup needed)	
2	Field Works / Cost of Experimental Setup (if applicable)	
3	Conveyance / Data Collection (with breakup)	
4	Typing, Drafting, Binding and Paper etc.	
Total Amount:		

14. **Justification of having Co-Supervisor:**

Co-Supervisor(s) are acceptable only if the supervisor can justify that the work requires considerable knowledge of a discipline other than his own field of work.

15. **Appointment of Supervisor and Co-Supervisor Approved by CASR**:

Meeting No: Date: Reference No:

16. **Appointment of Doctoral Committee Approved by CASR**:

Meeting No: Date: Reference No:

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17. Doctoral Committee:

Sl. No.	Name of the Committee members with affiliation
1	Chairman (Supervisor):
2	Member (Co-supervisor, if any):
3	Member-1(Ex-officio): Head,
4	Member-2:
5	Member-3:
6	Member-4:

18. Result of the Candidacy Examination: (*Photocopy of result should be enclosed*)

Satisfactory/ Unsatisfactory Date:

19. BPGS Reference: Date of BPGS Meeting:

	Names and Signatures of the Members of the Doctoral Committee (5 to 7 Members)	
---------- Signature of the Supervisor: Date:	1	
---------- Signature of the Supervisor: Date:	2	
	3	
---------- Signature of the Supervisor: Date:	4	
	5	
---------- Signature of the Head of the Dept: Date:	6	
	7	

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ANNEXURE – 4

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY, DHAKA
OFFICE OF THE MEMBER SECRETARY OF THE COMMITTEE FOR ADVANCED STUDIES AND RESEARCH

Application for the **Approval of Board of Examination for the Ph.D./M.Phil./M.Sc.Engg.**

Degree
(All the items/sub-items of the following list that are applicable to ones must be mentioned and filled in properly)

Date of Application:

1. **Name of the Student:** **Status**: Full Time/ Part Time
   Roll No: **Session**: Apr. 20..../ Oct. 20....
2. **Present Address:**
   Email: Tel No:
3. **Name of the Department:**
   Program (Ph.D./M.Phil./M.Sc.Engg.): Division (if any):
4. **Session of First Enrolment in the Program:**
5. **Title of the Thesis as Approved by CASR** (if any)**:**
6. **Thesis Proposal Approved by CASR** (if any)**:**
   Meeting No: Date: Reference No:
7. **Doctoral Committee Approved by CASR:**
   Meeting No: Date: Reference No:
8. **BPGS Reference:** Date of BPGS Meeting:
9. **List of Courses so far Completed with Course No, Course Title, Credit Hour, Grade, Grade Point and GPA:** *(To be verified and signed by the Program Coordinator)*

Sl. No.	Course No	Course Title	Credit	Grade	Grade Point	CGPA

Signature of the Program Coordinator:
Date:

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10. Name of the Thesis Supervisor:

11. Name of the Co-Supervisor (if any)**:**

12. Time Extension (if any) **Approved by the CASR:**

Meeting No.: Date: Reference No:

Signature of the Student

Date:

To be Filled in by the Head of the Department/Supervisor

13. Expected Date of Examination: Date:

14. Suggested Board of Examiners:

(i) Name:

Designation:

Affiliation:

(ii) Name:

Designation:

Affiliation:

(iii) Name (Head of the Dept.)**:** Designation:

Affiliation:

(iv) Name:

Designation:

Affiliation:

(v) Name:

Designation:

Affiliation:

Signature of the Supervisor:

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(Supervisor) **Chairman**

(Co-Supervisor, if any) **Member**

(Ex-Officio) **Member**

Member (Internal)

Member (External)

Signature of the Head of the Dept.:

Date:

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ANNEXURE – 5

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY, DHAKA
OFFICE OF THE MEMBER SECRETARY OFmTHE COMMITTEE FOR ADVANCED STUDIES AND RESEARCH

Application for the **Approval of M.Engg. Project Proposal**

(All the items/sub-items of the following list that are applicable to ones must be mentioned and filled in properly)

Date of Application:

1. **Name of the Student:** **Status:** Full Time/ Part Time

   Roll No: **Session:** Apr. 20…. / Oct. 20….

2. **Present Address:**

   Email: Tel No:

3. **Name of the Department:**

4. **Session of First Enrolment in the Program:**

5. **Name of the Supervisor:**

Affiliation:

Email: Tel No:

6. **Project Title:** (IN BLOCK LETTERS)

7. **Total Cost of the Project:** Tk. (In words)**:**

8. **BPGS Reference**: Date of BPGS Meeting:

9. **Project Proposal:** *(Not more than 200 words)*

Please describe briefly background, specific objective, methodology and possible outcome of the project in not more than 200 words.

Signature of the Student:

Date:

Signature of the Supervisor:

Date:

Signature of the Head of the Dept.:

Date:

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মিরপুর সেনানিবাস, ঢাকা-১২১৬

ANNEXURE – 6

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY, DHAKA
OFFICE OF THE MEMBER SECRETARY OF THE COMMITTEE FORADVANCED STUDIES AND RESEARCH

Application for the **Approval of Board of Examination for the M.Engg. Degree**

(All the items/sub-items of the following list that are applicable to ones must be mentioned and filled in properly)

Date of Application:

1. **Name of the Student:** **Status:** Full Time/ Part Time
   Roll No: **Session**: Apr. 20…. / Oct. 20….
2. **Present Address:**
   Email: Tel No:

3. **Name of the Department**:

4. **Session of First Enrolment in the Program**:

5. **Name of the Supervisor**: Affiliation:

6. **Title of the Project**:

7. **Project Proposal Approved by CASR:**

   Meeting No: Date: Reference No:

8. **Approved Time Extension (if any) up to**:

   CASR Meeting No: Date: Reference No:

9. **BPGS Reference**: Date of BPGS Meeting:

10. **List of Courses so far Completed with Course No, Course Title, Credit Hour, Grade, Grade Point and CGPA:** *(To be verified and signed by the Program Coordinator)*

Sl. No	Course No	Course Title	Credit	Grade	Grade Point	CGPA

Signature of the Student:
Date:

Signature of the Program Coordinator:
Date:

কাজী ওমর বায়েজীদ
মেজর
কর্ড টু ইন্সপেক্টর অব কলেজেস্
বাংলাদেশ ইউনিভার্সিটি অব প্রফেশনালস্
মিরপুর সেনানিবাস, ঢাকা-১২১৬

To be Filled in by the Head of the Department/Supervisor

11. Expected Date of Examination:

12. Suggested Board of Examiners:

(i)	**Name:** Designation: Affiliation:	(Supervisor)	**Chairman**
(ii)	**Name** (Head of the Dept.)**:** Designation: Affiliation:	(Ex-Officio)	**Member**
(iii)	**Name:** Designation: Affiliation:		**Member**
(iv)	**Name:** Designation: Affiliation:		**Member**

Signature of the Supervisor:

Date:

Signature of the Head of the Dept.:

Date:

কাজী ওমর বায়েজীদ
মেজর
কর্ড টু ইন্সপেক্টর অব কলেজেস্
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মিরপুর সেনানিবাস, ঢাকা-১২১৬

ANNEXURE – 7 (Thesis Format)

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

General Guidelines on Format of Thesis Submitted for Examination or Final

Submission
1. General Information

A Master's thesis must make some contribution to knowledge and not be mere collation of existing material. A PhD thesis must make a significant contribution to the knowledge of the subject concerned or provide evidence of originality either by the discovery of new facts or by the exercising of independent critical ability.

Work which has been submitted for another degree, or for which a degree has already been conferred by this Institute or any other university, may not be submitted again as a thesis but you are not precluded from incorporating part of such work provided that, in the thesis, you clearly indicate the part of the work which has been so incorporated.

Furthermore, please note that any work carried out before your enrolment in the University cannot be used for submission in a thesis examination, unless you have obtained approval from your supervisor and the Faculty.

The thesis must be written in English unless otherwise specified. Before submission of the thesis, you should seek consent from copyright owners for the inclusion of any third party proprietary/confidential intellectual property in the thesis.

Politically and commercially-sensitive information; or proprietary/confidential information which is not critical to the thesis and for which consent is not granted, should be excluded from the thesis. If necessary, such information could be included as appendices instead.

Most thesis authors experience major difficulties with tense in their documents. Many theses become a muddled mixture of past, present and future tense. To alleviate this problem, a simple solution is to treat the thesis as a historical document which will be read many years from the date of publication. The following grammatical procedure can then be adopted:

All general discussions and all discussions of experiments, equipment, etc. are written in the past tense (e.g., "*The test-tubes were acquired from a standard batch that was available at the time of experimentation...*").

References to mathematical formulae are written in the present tense (e.g., "*Equation 7.2 highlights the relationship between...*").

References to objects (sections, tables, diagrams, etc.) in the thesis are in the present tense (e.g., "*Section 2.9 contains a discussion on...*").

References to future work are also written in the past tense (e.g., "*It was determined that future developments could lead to an increase in...*").

কাজী ওমর বায়েজীদ
মেজর
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বাংলাদেশ ইউনিভার্সিটি অব প্রফেশনালস্
মিরপুর সেনানিবাস, ঢাকা-১২১৬

2. Thesis Title

The title has to be approved from the CASR after having recommendation from BPGS. If

the thesis title differs significantly from the original approved title, the candidate must request for a change of title using the prescribed application form and take necessary approval from the CASR.

3. General Formatting

Page Size	Each copy of the thesis must be printed on A4 size (8.27" x 11.69") paper (offset paper with minimum weight should be 80 gm) with white background and black colour font for the text.
Print Quality	Clear, clean and sharp copies are required. In the case of photocopies, no fading, extraneous marks or gray background should appear.
Margins	The top, bottom and right margins should be 25 mm from the edge of the paper and left margin should be 35 mm from the edge of the paper. A right justified margin is acceptable which must be consistent throughout the thesis.
Font	The font size for the main text should be 11 to 12 points. The same font type and size should be used for the entire thesis (with possible exception for figures and appendices). Do not choose a font that is difficult to read. The following fonts are acceptable: Times Roman and Helvetica.
Line Spacing	The text should be double-spaced throughout with the following exceptions: Captions for Figures/Tables: should be single-spaced List of Figures/Tables: should be single-spaced and double-spaced between entries Footnotes: should be single-spaced
Page Numbering	All pages except the title page must be paginated. The page numbers must appear at the bottom centre of the page. The position of the page numbers should not change even on pages with landscape mode illustrations. All material preceding the thesis proper (introductory sections starting from acknowledgements to summary) may have a separate sequence of numbering, preferably in roman numerals beginning with i. Plates, maps, plans, diagrams, tables, etc., should also be given a separate sequence of numbering. The main body of the thesis should be numbered in arabic numerals from 1 onwards. The numbering must be consecutive throughout the thesis and should include all maps, diagrams, photographs, etc. Published material submitted with the thesis whether bound in with the thesis or not, should not be included in the pagination but must maintain the same margins, font type and size. For a thesis which consists of more than one volume, one numbering sequence should be used, for example, if volume I ends at p.200, volume II should begin with p.201.

Footnotes	Footnotes should appear at the bottom of each page for easy reference and not at the end of the chapter.
Printing	The thesis should be printed in single sided format.

4. Sequence of Content

The content of the thesis should be in the following order:
Title page

A blank page
Approval page Declaration page Summary

Acknowledgements Table of Contents List of Tables
List of Figures

List of Illustrations List of Symbols

Main body of thesis

Bibliography or references Appendices

A blank page

5. Title Page

The title page should contain the following information in BLOCK LETTERS not exceeding 16 points:

Thesis title

Candidate's name (with qualification(s) in brackets)

The words: "**A THESIS SUBMITTED FOR THE DEGREE OF** <NAME OF DEGREE>"

Department: **DEPARTMENT OF** <NAME OF DEPARTMENT>

Name of Institute/University: **MILITARY INSTITUTE OF SCIENCE AND**

TECHNOLOGY

Year of first submission of thesis: If the thesis is resubmitted in a subsequent year, the year of submission to be indicated on the title page should remain as year of first submission.

Sample of the Title Page:

A MODELING STUDY OF WASTEWATER

TREATMENT PLANT

Rafi Rahman

(*BSc Engg., MIST*)

A THESIS SUBMITTED

FOR THE DEGREE OF MASTER OF ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING
MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

2019

6. Declaration Page

The words on this page should be of a font size of 12 points. The following should be stated:

"*Declaration*

I hereby declare that this thesis is my original work and it has been written by me in its entirety. I have duly acknowledged all the sources of information which have been used in the thesis. This thesis has also not been submitted for any degree in any university previously."

Candidate should sign at the bottom of the page with the candidate's name and the date indicated.

Sample of the Declaration Page:

DECLARATION

I hereby declare that this thesis is my Original work and it has been written by me in its entirety. I have duly acknowledged all the sources of information which have been used in the thesis.

This thesis has also not been submitted for any degree in any university previously.

_____

Rafi Rahman

1 April 2019

7. Summary

The thesis must contain a summary of not more than 500 words written in the English Language in each copy of the thesis. The summary should be a miniature version of the thesis and should contain summary of the results, conclusions and main arguments presented in the thesis.

8. Photographs, Illustrations and Other Attachments

Photographic and other illustrations should be securely mounted using double-faced tape. Photograph album pockets or slits in the page are not adequate. In no circumstances should 'cellophane tape' or a similar material be used for any purpose in a copy of the thesis. All copies of the thesis should contain original photographs.

Subsidiary papers and other loose material should be bound in wherever possible. If this is not possible, an adequately guarded pocket for each material should be provided at the end of the thesis. Any such loose material (and corrigenda sheets, if not bound in) should bear the candidate's name, initials and degree.

9. Approval Page

The approval page has to be included in the hard bound final copy of the thesis.

Sample of the Approval Page:

The thesis titled .... Submitted by ..... Roll No: ..... Session: ..... has been accepted as satisfactory in partial fulfillment of the requirement for the degree of ..... on.....

Board of Examiners

1.	(Signature) Name of the supervisor Designation & Address	Chairman
2.	(Signature) Name of the supervisor Designation & Address	Member
3.	(Signature) Name of the supervisor Designation & Address	**Member**
4.	(Signature) Name of the supervisor Designation & Address	**Member (Ex-officio)**
5.	(Signature) Name of the supervisor Designation & Address	**Member (External)**

10. Main Bodies

1. CHAPTER TITLES SHOULD BE CENTERED BOLD 14 POINT Text in the chapter titles should be in upper case.

1.1 Secondary Headings Should be Flash Left 12 Point Bold

The first letter in each word of the secondary heading should be capitalized.

1.1.1 Third level headings should be flush left 12 point bold

Only the first letter of the first word of the third level heading should be capitalized

In the case of the paragraph starting left justified, there should be a spacing between the paragraphs. Otherwise, the paragraphs may be indented by a consistent amount.

The font, point size, positioning, numbering and referencing of equation:

The typeface for equations will be 12 point Times New Roman and are to be numbered sequentially by chapters (right justified). Reference for equation numbers in the text should be enclosed in parenthesis, such as (5.2).

The layout and numbering of figures and tables and their captions:

Figures should be centered between the left and right margin with their captions centered below the figure in point size 12 Times New Roman single spaced. Figures should be consecutively numbered per chapter. The word Figure may be abbreviated as "Fig". Tables should be centered between the left and right margin with their captions

(12 point Times New Roman) centered above the table. Tables should be consecutively numbered per chapter. Main heading and number of Figures and Tables should be bold.

Part B gives an overview of different chapters of a thesis.

11. References

A numbered list of references must be provided at the end of the thesis, before any appendices. The list should be numbered either in the order of citation in the text, or in alphabetical order, and there should be only one reference per reference number. Each reference number should be enclosed in square brackets. Samples are shown below:

Books:

[1] Brognakke, C. (1984), "Flame Propagation and Heat Transfer Effets in Spark Ignition Engines", In J. C. Hillard and G. S. Springer (eds.), Fuel Economy in Road Vehicles Powered by Spark Ignition Engines, chap 5, pp 183-224, Pienum Press, New York.

[2] Farrelly, D. (1966), "*The book of bamboo*", Thames and Hudson Ltd., London.

Journals/Periodicals:

[3] Benson, R. S., Garg, R. D. and Woolatt, D. (1964), "A Numerical Solution of Unsteady Flow Problems", *Journal of Mechanical Engineering*, vol. 6, pp. 117-144.

Articles from published conference proceedings:

[4] Nichols, M. A., Siegel, H. J. and Nation, W. G. (1990), "Minimizing memory requirements for partitionable SIMD/SPMD machines", *Proceedings of the International conference on Parallel Processing*, pp. 84-91.

Papers presented at conferences (unpublished):

[5] Ebehard, D. and Voges, E. (1984), "Digital single sideband detection for interferometric sensors", *presented at 2nd International conference on Optical Fiber Sensors*, Stuttgart, Germany.

Reports:

[6] GOB (1993), National housing policy 1993. Government of Bangladesh, Ministry of Housing and Public Works, Dhaka, Bangladesh.

Thesis:

[7] Rahman, M. A. (1998), "The structure of Turbulent Mixing Layers", *M. Sc. Engg. Thesis*, Department of Mechanical Engineering, BUET, Bangladesh, pp. 198.

12. Appendices

Appendices should contain supplementary material that the author considers necessary to the interpretation of the text itself. Long tables, essential raw data, detailed reports or computer are generally more appropriately included in an appendix. Appendices should not be longer that the body of the thesis and normally would be considerably shorter. If there is more than one appendix, the appendices should be numbered in sequence using Arabic numerals. Appendices should be numbered as A-1, A-2, ... B-1, B-2... etc. for respective appendix.

13. Thesis Cover and Spine

The front cover and spine of the thesis should contain only the following information in BLOCK LETTERS. The font size on the cover should not exceed 16 points:

<table>
<tr>
<td>Thesis Cover:

• Thesis Title
• Candidate's Name
• Name of Institute
• Year of first submission</td>
<td>Thesis Spine:

Thesis Title (or an abbreviated title)
Candidate's Name
Year of first submission</td>
</tr>
<tr>
<td>Sample of Thesis Cover:

A MODELING STUDY OF WASTEWATER TREATMENT PLANT

RAFI RAHMAN

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

2019</td>
<td>Sample of Thesis Spine

A MODELLING STUDY OF RAFI RAHMAN 2019
WASTEWATER TREATMENT PLANT</td>
</tr>
</table>

14. Type of Cover/Binding

For submission of your thesis for examination/re-examination, the thesis should be bound with soft cover (light blue with black lettering not exceeding 16 points) using saddle-stitch or perfect binding (spiral or ring-back binding is not acceptable).

For final submission the thesis/project report should be sewn and bound in strong, waterproof material. Color of the binding material for various degrees will be as follows. The Lettering in all cases will be in golden color.

PhD:	Black
M.Sc./M.Phil:	Dark Blue
M..Engg.:	Blue

Format of the thesis

Chapter 1 - Introduction (Thesis Body)	This is the most crucial chapter in the thesis and the one which requires the most careful consideration. The reader must be introduced, in a step by step fashion, to the purpose of the project, concepts and ideas related to the project and the structure of the following sections of the thesis. This section should endeavour to treat technical issues in a ***qualitative*** manner so that the reader can clearly understand the task at hand, without reference to other texts or periodicals. Formal page numbering for the body of the thesis begins in this section. Pages should preferably be numbered in a simple sequential order and should be chapter independent (ie: page numbers such as 1.2, 2.7 are not appropriate).
Chapters 2..N (Thesis Body)	This is the portion of the thesis in which literature surveys are discussed, research and development techniques are explained, theories, models and systems formulated and results evaluated. In general, the body of the thesis should be free from long, complex calculations, routine mathematical proofs, program code or large volumes of raw data. Page numbering continues on from the introductory chapter.
Chapter N+1 Conclusions and Recommendations for Further Work	This should draw together the main findings of the research program, together with findings of literature surveys carried out at the beginning and the end of the research program. Recommendations should also be made for future research in related areas. Page numbering should be a continuation from the previous section.
References	A listing of all references from which data has been abstracted for the purposes of the thesis. Preferably, the references should be listed in the order in which they are referred to in the body of the thesis. Page numbering is a continuation of previous sections.
Appendices	Appendices are used to store important calculations, proofs, tables or code which would interrupt the flow of qualitative descriptions in the body of the thesis. Each appendix has its own page numbering scheme. For example, Appendix A would have numbers A-1, A-2, etc. Appendix X would have numbers X-1, X-2, etc.
Index	This is generally an optional section in which common words or phrases, occurring in the body of the thesis are referenced to

	page numbers. Modern word-processors make the task of compiling an index considerably easier and hence authors may wish to include them. Page numbering can be a continuation of the Appendix Format.

\

Thesis Complexity by Chapter

Complexity	***Chapter***	***Function***
Lay-reader		Abstract
Lay-reader	1	Introduction
	2	Literature Review
Expert	3	Methodology and Implementation
	4	Experimental Procedures for Methodology Assessment
	5	Experimental Results and Observations
	6	Broad Context Discussion of Results and Relevance
Lay-reader	7	Conclusions and Recommendations for Further Work
-	-	References
-	-	Appendices

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY, DHAKA

OFFICE OF THE MEMBER SECRETARY OF

THE COMMITTEE FOR ADVANCED STUDIES AND RESEARCH

Progress Report of a Postgraduate Student for Ph.D./M.Phil./M.Sc.Engg./M.Engg. Degree

(All the items/sub-items of the following list that are applicable to ones must be mentioned and filled in properly)

Part I: To be Completed by the Student:

1. **Name of the Student:** **Status:** Full Tim / Part Time
   Roll No: Session: Apr. 20.... / Oct. 20....
2. **Present Address:**
   Email: Tel No:
3. **Name of the Department:**
   Program (Ph.D./M.Phil./M.Sc.Engg./M.Engg.): Division (if any):
4. **Session of First Enrolment in the Program:**
5. **Name of Supervisor:**
6. **Title of the Thesis** (if approved by CASR)**:**
7. **Expected Date of Completion of Degree**:
8. **List of Courses so far Completed with Course No, Course Title, Credit Hour, Grade, Grade Point and GPA:** *(To be verified and signed by the Program Coordinator)*

Sl. No.	Course No	Course Title	Credit	Grade	Grade Point	GPA

Signature of the Program Coordinator

Date:

কাজী ওমর বায়েজীদ
মেজর
কর্ড টু ইন্সপেক্টর অব কলেজেস্
বাংলাদেশ ইউনিভার্সিটি অব প্রফেশনালস্
মিরপুর সেনানিবাস, ঢাকা-১২১৬

9. **Research Activities and Findings** *(within 200 words)*:

10. **Publications** *(List complete citations for all papers published and manuscripts in press or in preparation)*:

Part II: To be Completed by the Supervisor:

11. **Comments by the Supervisor** *(Please provide a brief evaluation of the student's performance)*:

12. Rating of Student's Performance by the Supervisor: (circle one)

Progress is excellent *Progress is satisfactory* *Progress is unsatisfactory*

---------- Signature of the Supervisor

Date:

---------- Signature of the Head of the Dept.

Date

CHAPTER 3

SYLLABUS FOR THE MASTERS DEGREE PROGRAMMES

3.1 Progamme Outcome

The students will acquire the following attributes on achieving the post-graduation degree:

(a) PO 1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

(b) PO 2: Problem analysis: Identify, formulate, research the literature and analyze complex engineering problems and reach substantiated conclusions using first principles of mathematics, the natural sciences and the engineering sciences.

(c) PO 3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety as well as cultural, societal and environmental concerns.

(d) PO 4: Investigation: Conduct investigations of complex problems, considering design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

(e) PO 5: Modern tool usage: Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

(f) PO 6: The engineer and society: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.

(g) PO 7: Environment and sustainability: Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.

(h) PO 8: Ethics: Apply ethical principles and commit to professional ethics, responsibilities and the norms of the engineering practice.

(i) PO 9: Individual work and teamwork: Function effectively as an individual and as a member or leader of diverse teams as well as in multidisciplinary settings.

(j) PO 10: Communication: Communicate effectively about complex engineering activities with the engineering community and with society at large. Be able to comprehend and write effective reports, design documentation, make effective presentations and give and receive clear instructions.

(k) PO 11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work as a member or a leader of a team to manage projects in multidisciplinary environments.

(l) PO 12: Life-long learning: Recognize the need for and have the preparation and ability to engage in independent, life-long learning in the broadest context of technological cha

3.2 Summary of Masters Courses

Course No	Course Title	Credit
Courses: Compulsory		
NAME 6000	Thesis	M.Sc.Engg.: 18
NAME 6001	Seminar	Credit included in Thesis/Project
NAME 6002	Project	M.Engg.: 6
Courses: General Subjects		
NAME 6101	Advanced Engineering Mathematics	3.0
NAME 6103	Applied Mechanics of Composite Materials	3.0
NAME 6105	Advanced Materials & Surface Engineering	3.0
NAME 6107	Marine and Offshore Corrosion	3.0
NAME 6109	Advanced Dredging Technology	3.0
NAME 6111	Advanced Port & Harbor Engineering	3.0
NAME 6113	Advanced Marine Transportation System	3.0
NAME 6115	Advanced Inland Water Transportation System	3.0
NAME 6117	Vibrations and Noises in Marine Structures	3.0
NAME 6119	Offshore Drilling and Subsea Engineering	3.0
NAME 6121	Advanced Numerical Analysis	3.0
NAME 6123	Allocated for addition of relevant subject.	3.0
NAME 6125	Allocated for addition of relevant subject.	3.0
Courses: Ship Design and Structures		
NAME 6201	Applied Ship Design	3.0
NAME 6203	Advanced Ship Structure	3.0
NAME 6205	Finite Element Method for Ship Structure	3.0
NAME 6207	Fracture Mechanics	3.0
NAME 6209	High Speed Marine Vehicles	3.0
NAME 6211	Advanced Offshore Structures	3.0
NAME 6213	Advanced Theory of Resistance and Propulsion	3.0
NAME 6215	Allocated for addition of relevant subject.	3.0
Courses: Marine Engineering		
NAME 6301	Advanced Marine Engineering	3.0
NAME 6303	Marine Instrumentation and Controls	3.0
NAME 6305	Submarine Engineering	3.0
NAME 6307	Marine Nuclear Power Engineering	3.0
NAME 6309	Allocated for addition of relevant subject.	3.0
Courses: Marine Hydrodynamics		
NAME 6401	Advanced Theory of Hydrodynamics	3.0
NAME 6403	Mechanics of Water Waves	3.0
NAME 6405	Advanced Computational Fluid Dynamics	3.0
NAME 6407	Hydrodynamic Loading of Floating Body	3.0
NAME 6409	Turbulence Modelling	3.0
NAME 6411	Allocated for addition of relevant subject.	3.0

3.3 Detailed Syllabus of Masters Courses

The detailed syllabus of the subjects listed in para 2.2 are enumerated in this section by serial.

COMPULSORY COURSES

কাজী ওমর বায়েজীদ
মেজর
কর্ড টু ইন্সপেক্টর অব কলেজেস্
বাংলাদেশ ইউনিভার্সিটি অব প্রফেশনালস্
মিরপুর সেনানিবাস, ঢাকা-১২১৬

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Thesis

Course Code: NAME 6000

Level: M.Sc. programme

Credit Hour: 18 for M.Sc. Engineering

Contact Hour: As required and specified by the supervisor and concerned committee/board.

Rationale: Compulsory course for M.Sc. Engineering and PhD degree based on advanced level of research in line with theoretical courses undertaken and fields under the guidance of assigned supervisor or doctoral committee to undertake innovation and development in science and technology for the well-being of mankind.

Course Content: As defined and specified by supervisor and concerned board.

Learning Outcomes (LO): On successful completion of this course unit, students should be able to:

1. Address a physical and scientific problem for in depth study;
2. Utilize mathematical models or experimental means developed for scientific researches;
3. Develop new mathematical models or experimental means for further researches;

Teaching-learning Strategy: Research papers review, Literature review, Laboratory works, Field visits, Industry evaluation etc.

Assessment Strategy: As convenient by supervisor and concerned board/committee using following tools:

1. Evaluation of thesis works.
2. Evaluation of thesis report.
3. Formal presentation on thesis progress to BPGS.
4. Viva voce to BPGS.
5. Thesis defense to Board of Exam.

Linkage of LO with Assessment Methods & their Weights:

As convenient by supervisor and concerned board/committee.

Mapping of Course LO and Program Outcomes (PO):

Will remain flexible for supervisor

Reference Books:

1. As advised by supervisor/co-supervisor/board.

Grading system: As per approved grading scale of MIST

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Seminar

Course Code: NAME 6001

Level: Post-graduation programme

Credit Hour: Non-Credit course. But the thesis/project course will include the credit requirement of seminar for M.Sc. Engineering, M. Engineering and PhD degree.

Contact Hour: As specified by the supervisor and BPGS of NAME Dept.

Rationale: Compulsory course for for M.Sc. Engineering, M. Engineering and PhD degree based on ongoing advanced level of research in line with theoretical courses undertaken and fields under the guidance of assigned supervisor or BPGS of NAME Dept.

Course Content: As defined and specified by supervisor and concerned board.

Learning Outcomes (LO): On successful completion of this course unit, students should be able to:

1. Present research works and review of research papers to the audience;
2. Interact with similar researchers;
3. Apply the research tools for further research.

Teaching-learning Strategy: Presentation and discussions.

Assessment Strategy: As convenient by supervisor and BPGS of NAME Dept using following tools:

1. Submission of research paper (Conference proceeding/journal article)
2. Review of research paper.
3. Oral presentation.
4. Poster presentation.

Linkage of LO with Assessment Methods & their Weights:

As convenient by supervisor and concerned board/committee.

Mapping of Course LO and Program Outcomes (PO):

Will remain flexible for supervisor

Reference Books:

1. As advised by supervisor/co-supervisor/board.

Grading system: As per approved grading scale of MIST

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বাংলাদেশ ইউনিভার্সিটি অব প্রফেশনালস্
মিরপুর সেনানিবাস, ঢাকা-১২১৬

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Thesis

Course Code: NAME 6002

Level: Post-graduation programme

Credit Hour: 6 for M.Engineering

Contact Hour: As required and specified by the supervisor and concerned committee/board.

Rationale: Compulsory course for M. Engineering on advanced level of research in line with theoretical courses undertaken and fields under the guidance of assigned supervisor to undertake innovation and development in science and technology for the well-being of mankind.

Course Content: As defined and specified by supervisor and concerned board.

Learning Outcomes (LO): On successful completion of this course unit, students should be able to:

1. Address a physical and scientific problem for in depth study;
2. Utilize mathematical models or experimental means developed for scientific researches;
3. Develop new mathematical models or experimental means for further researches;

Teaching-learning Strategy: Research papers review, Literature review, Laboratory works, Field visits, Industry evaluation etc.

Assessment Strategy: As convenient by supervisor and concerned board/committee.

Linkage of LO with Assessment Methods & their Weights:

As convenient by supervisor and concerned board/committee.

Mapping of Course LO and Program Outcomes (PO):

Will remain flexible for supervisor

Reference Books:

1. As advised by supervisor/co-supervisor/board.

Grading system: As per approved grading scale of MIST

কাজী ওমর বায়েজীদ
মেজর
কর্ড টু ইন্সপেক্টর অব কলেজেস্
বাংলাদেশ ইউনিভার্সিটি অব প্রফেশনালস্
মিরপুর সেনানিবাস, ঢাকা-১২১৬

GENERAL COURSES

কাজী ওমর বায়েজীদ
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MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Advanced Engineering Mathematics

Course Code: NAME 6101

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Rationale: Theoretical course based on advanced level of mathematics to undertake problem solving tools for the application of governing equations and relevant conditions.

Course Content:

Numerical Analysis: Refreshing of matrix operations, Eigenvalue and Eigen-vectors; Solution of algebraic and transcendental equations. Numerical solution of ordinary differential equation, Taylor series Method, Euler's method, Runge-Kutta method. Accuracy of one step method, multistep method. System of differential equation. Initial value problems of linear and nonlinear system of equations; Boundary value and Engineering problems (linear and nonlinear). Shooting method (linear and nonlinear), finite difference method. Solution of applied problems. Solution of partial differential equation- Elliptic, Parabolic, Hyperbolic partial differential equation with special consideration to Heat Equation.

Fourier Analysis: Fourier series expansion for a single variable, Real and complex form, Convergent Fourier series, Calculus of Fourier series, Fourier integral formula and Fourier transforms. Fourier transform and its properties. Convergence of Fourier series, Fourier transforms for single and multivariable. The discrete Fourier transform and properties. Application in solving boundary value problems. Outline of boundary layer theory, Derivation of Navier-Stokes equations, Exact solutions of the Navier-Strokes equations. Very slow motions, Boundary layer equations for two dimensional flow, Boundary layer on a flat plate, Boundary layer development on actual ships. Boundary layer formation over large hull projections and appendage. Detailed effects of hull roughness on the ship boundary layer. Friction formulations taking account of curvature and roughness. Separation of boundary layers around ship components.

Learning Outcomes (LO): On successful completion of this course unit, students should be able to:

4. Present a physical and scientific problem into mathematical expressions;
5. Transform between mathematical modes and models;
6. Utilize mathematical models already developed for scientific researches;
7. Develop new mathematical models for specific scientific researches;

Teaching-learning Strategy: Class lectures, Case studies, Research papers review, group discussions etc.

Assessment Strategy: Class tests, Assignments, Presentation and Final exam.

Linkage of LO with Assessment Methods & their Weights:

Learning Outcome	Assessment Methods	Weightage	Remarks
LO 1-2	Class participation and observation	5%	
LO 1-3	Class test/Assignment/Case study /Presentation	25%	
LO 1-4	Final Examination	70%	
Total		**100%**	

Mapping of Course LO and Program Outcomes (PO):

Learning Outcomes (LOs) of this course	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
LO 1		x										x
LO 2			x									
LO 3					x							
LO 4		x			x							

Reference Books:

2. Advanced Engineering Mathematics – P. V. Oneil;
3. Applied Numerical Analysis – G. Wheatley;
4. Theoretical Numerical Analysis: Introduction to Advanced Techniques – Peter Linz.

Grading system: As per approved grading scale of MIST

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MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Applied Mechanics of Composite Materials

Course Code: NAME 6103

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Rationale: Theoretical course based on macro and micro mechanics to undertake development and construction applications of composite materials.

Course Content:

Composite materials and their characteristics: Stiffness of unidirectional composites; stiffness, strength, and coefficients of thermal and moisture expansion from individual properties of the constituents; Transformation of stress and strain; Micro-mechanics and macro-mechanics of lamina; Off-axis stiffness of unidirectional composites; In-plane stiffness of symmetric laminates; Flexural stiffness of symmetric sandwich laminates; Behaviour of general laminates; special cases of laminates used in the market; Strength of composite materials and their modes of failure; Functionally graded materials (FGM). Computer language (FORTRAN or MATLAB) based solution for mechanics of composite materials.

Learning Outcomes (LO): On successful completion of this course unit, students should be able to:

1. Explain the composition mechanism of a composite materials and related parameters;
2. Apply composite materials in the enhancement of marine construction;
3. Find out the effect of orientation and size of fibers in the matrix in terms of strength and other properties;
4. Demonstrate the effect of moisture and temperature variation in the composite materials;
5. Develop mathematical models related to mechanics of composite materials for scientific researches.

Teaching-learning Strategy: Class lectures, Case studies, Research papers review, group discussion, presentation, industrial visit etc.

Assessment Strategy: Class tests, Assignments, Presentation and Final exam.

Linkage of LO with Assessment Methods & their Weights:

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Learning Outcome	Assessment Methods	Weightage	Remarks
LO 1-3	Class participation and observation	5%	
LO 1-5	Class test/Assignment	15%	
LO 1-5	Case study /Presentation	10%	
LO 1-5	Final Examination	70%	
Total		**100%**	

Mapping of Course LO and Program Outcomes (PO):

Learning Outcomes (LOs) of this course	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
LO 1		x										x
LO 2			x									
LO 3					x							
LO 4		x			x							
LO 5		x							x			

Reference Books:

1. Mechanics of Composite Materials – A. K. Kaw;
2. Mechanics of Composite Materials – R. Jones;
3. Composite Materials: Science and Engineering – K. K. Chawla;
4. Mechanics of Composite Materials with MATLAB – G.Z. Voyiadjis and P. I. Kattan.

Grading system: As per approved grading scale of MIST

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MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Advanced Materials & Surface Engineering

Course Code: NAME 6105

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Rationale: Theoretical course based on engineering materials with particular attention to new marine grade materials, smart materials, shape memory alloys etc.

Course Content:

Material Structure: Details of material structure, structure property correlation, materials of construction, Micro and Macro examination of material, behavior of metals under fatigue, creep, corrosion, low temperature, high temperature, fracture mechanics and fracture toughness role of residual ductility in corrosion fatigue.

Materials for ships: Metals, alloys and material used on ships (piston, cylinder liner & head, DE valves, propeller, turbine blades, impeller, heat exchangers, chilling plants, LNG tanks, ship's hull). Special polymeric material like PVC, Teflon, Polypropylene. Super alloys like satellite and other hard facing material for ship's hull and other special application.

Heat treatment processes: Advanced heat treatments processes of steel based on T-T-T curves. Advanced steel making processes. Special steel for shipbuilding, advanced heat treatment processes.

Metallurgical aspect of metal joining: Thermo-mechanical treatment and effect on material , soldering and brazing , metallurgical effect of welding ; hot cracking, welding high tensile steel, welding cast iron, welding stainless steel, welding copper and it's alloys, welding brasses, welding bronzes and other alloys. Testing of Material: Advanced study tensile test, hardness test, notched bar test, various methods & machines for tests, Non -destructive tests etc.

Prevention of Corrosion & Cracks: Non-metallic coatings (paints), anodic & cathodic protection, Impressed Current Cathodic Protection, Metallic coatings; thermal spray coating, plasma spray coating, Laser alloying, high energy surfacing processes. Ion-implantation, Ion-plating, plasma enhanced ionic deposition for marine application. Diffusion Coating and Surface modification for improving hull efficiency. Prevention of static & dynamic stress corrosion cracking.

Modern Material: Discussion on recently developed material and study on them.

Learning Outcomes (LO): On successful completion of this course unit, students should be able to:

1. Explain the modern uses of engineering materials in the marine field;
2. Explain modern methods of thermal treatment of engineering materials;

3. Apply modern materials in making ship's hull and marine machinery/equipment;
4. Develop surface modification of engineering materials for specific applications in the aggressive environment of sea water for wear and corrosion;

Teaching-learning Strategy: Class lectures, Case studies, Research papers review, Industrial visit, Group discussions, Presentations etc.

Assessment Strategy: Class tests, Assignments, Presentation and Final exam.

Linkage of LO with Assessment Methods & their Weights:

Learning Outcome	Assessment Methods	Weightage	Remarks
LO 1-2	Class participation and observation	5%	
LO 1-4	Class test/Assignment/Case study /Presentation	25%	
LO 1-4	Final Examination	70%	
Total		**100%**	

Mapping of Course LO and Program Outcomes (PO):

Learning Outcomes (LOs) of this course	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
LO 1		x										x
LO 2			x									
LO 3					x							
LO 4		x			x							

Reference Books:

1. Metallurgy for Engineers - E, C Rollason
2. Mechanical Behavior of Materials – Marc Andr´e Meyers and Krishan Kumar Chawla
3. Mechanical properties of materials – David Roylance
4. Strength and Toughness of Materials – Toshiro Kobayashi
5. Advanced Techniques for Surface Engineering – W. Gissler and H. A. Jehn

Grading system: As per approved grading scale of MIST

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MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Marine and Offshore Corrosion

Course Code: NAME 6107

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Rationale: Theoretical course based on advanced level of Marine and Offshore Corrosion to understand the mechanism & impact of corrosion in marine environment and the control & prevention of corrosion in marine & offshore structures.

Course Content:

Fundamentals of marine corrosion: Mechanism of corrosion, Corrosion Zones, Corrosion Variables, Different types of corrosions in marine environment, Chemical corrosion, Electro chemical corrosion, Uniform corrosion, Galvanic corrosion, Pitting and crevice corrosion, Intergranular Corrosion (IC), Corrosion fatigue & stress corrosion cracking (SCC), Microbial induced corrosion (MIC), erosion corrosion, Corrosion above the waterline, Corrosion below the waterline and contemporary concepts on corrosion.

Corrosion monitoring, Control and Prevention: Corrosion testing, Cathodic protection, Sacrificial anodes protection, Impressed current system protection, surface coating, substrate treatments, etc.

Hull preservation from corrosion: Plate preparation during building and repair periods, Atmospheric corrosion mill scale, Flame cleaning, Acid pickling, Blast cleaning, Causes of paint failure, Shipboard preparations for painting, Power wire brushing – power discing – air hammer, High pressure water blasting, sand blasting and shot blasting.

Learning Outcomes (LOs): On successful completion of this unit, students should be able to:

1. Discuss the mechanism of corrosion in marine environment;
2. Distinguish between erosion and corrosion in marine & offshore structures;
3. Identify the different types of corrosion in marine environment;
4. Explain the different types of control & prevention system of corrosion;
5. Analyze Plate preparation during building and repair periods of marine & offshore structures;

Teaching-learning Strategy: Class lectures, Case studies, Research papers review etc.

Assessment Strategy: Class tests, Assignments, Presentation and Final exam.

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Linkage of LO with Assessment Methods & their Weights:

Learning Outcomes	Assessment Methods	Weightage	Remarks
LO 1-2	Class participation and observation	5%	
LO 3-5	Class test/Assignment/Case study/Presentation	25%	
LO 1-5	Final Examination	70%	
	Total	**100%**	

Mapping of Learning Outcomes (LO) and Program Outcomes (PO):

Learning Outcomes (LOs)	Program Outcomes (POs)											
	1	2	3	4	5	6	7	8	9	10	11	12
LO 1	x											
LO 2	x											
LO 3		x										
LO 4				x								
LO 5		x										

Reference Books:

1. Corrosion of Constructional Steels in Marine and Industrial Environment – Jayanta Kumar Saha
2. Marine and Offshore Corrosion – Kenneth A Chandler
3. Surface Engineering for Corrosion and Wear Resistance – J. R. Davis
4. Corrosion and Corrosion Control – R. Winston Revie

Grading System: As per approved grading scale of MIST.

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MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Advanced Dredging Technology

Course Code: NAME 6109

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Rationale: Theoretical course based on production, instrumentation and application aspect of dredging technology and system.

Course Content:

Theories of dredging: Introduction to Dredge Hydraulics, Production Rate Calculation: Dredge Law I, Production Equation, Production Measurement System; Dredge Efficiency: Dredge Law II, Efficiency Chart; Swing Width Effect; Hydraulic Transport Factors: Dredge Law III, Soil Classification;

Maximum Dredge Production: Dredge Law IV; The Suction Line and Digging Depth: Dredge Law V, Analysis of Suction Losses; Horse power and Line Length: Dredge Law VI, Recommended Pump Horse Power; Production Charts: Dredge Law VII, Booster Pump and Ladder Pump Effect; Dredge Cycle: Flow Regime and Friction; Cavitation: Causes and avoidance, Cavitation Chart;

Dredging in Practice: Selecting the Dredge Types, Cutter: Types and Functions; Dredge Pump: Types, Impeller, Horsepower Coefficient, Drive, Thrust; Ladder and Booster Pump: Design Requirements, Booster Pump vs Transport Distance; Wear in Pump and Pipelines, Auxiliary Equipment, Instrumentation and Automatic Control, Calculating and Bidding Dredging Project: Contract Document, Method of Calculation of different parameters, Production time, Costs, Bid Price; Personal Computer in Dredge Management, Operation and Trouble Shooting, Environment and Dredging, Dredging Demand in Bangladesh.

Learning Outcomes (LO): On successful completion of this unit, students should be able to:

1. Identify dredging technology, methods and equipment;
2. Investigate instrumentation and control of dredging;
3. Explain dredge law, efficiency and use of type of equipment for different type of soil conditions;
4. Analyze dredging techniques and methods, output and productions, etc.;
5. Develop and support effective dredging teams and dredging projects;

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মিরপুর সেনানিবাস, ঢাকা-১২১৬

Teaching-learning Strategy: Class lectures, Case studies, Industry evaluation,

Assessment Strategy: Class Tests, Assignments and Final exam.

Linkage of LO with Assessment Methods & their Weights:

Learning Outcomes	Assessment Methods	Weightage	Remarks
LO 3,5	Class participation and observation	5%	
LO 1-4	Home Work/Class Test/ Assignment/Case study/ Presentation	25%	
LO 1-5	Final Examination	70%	
Total		**100%**	

Mapping of Learning Outcomes (LOs) and Program Outcomes (POs):

Learning Outcomes (LOs)	Program Outcomes (POs)											
	1	2	3	4	5	6	7	8	9	10	11	12
LO 1	x											
LO 2				x								
LO 3	x											
LO 4		x										
LO 5											x	

Reference Books:

1. Fundamentals of Hydraulic Dredging, Thomas M Turner, ASCE Press;
2. Hand book of Dredging Engineering, 2nd Edition, John B, Herbich, McGraw-Hill Professional;
3. Dredging - ICE Deign and Practice Guides by Denis Yell and John Riddell;
4. Coastal, Estuaries and Harbor Engineers Reference Book, M. B. Abott and W. A. Price, E & FN Spon.

Grading System: As per approved grading scale of MIST.

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MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Advanced Port & Harbor Engineering

Course Code: NAME 6111

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Rationale: Theoretical course based on port and harbor layout and design.

Course Content:

Tides and harmonic analysis: Equilibrium theory of the tides, harmonic analysis of tides, harmonic analysis and continuous spectra.

Harbor Resonance: Free oscillation in closed basins, forced oscillations in basins of sample platform, modeling of resonance phenomenon in the laboratory.

Wave spectra: Statistical properties of individual waves, wave spectrum and wave transformation.

Harbor Planning: Ship characteristics, elements of harbor layouts, hydraulic aspects of harbor layout, layout of docks and breakwaters.

Break Water Design: Information on mound breakwater, wave pressure formula for composite breakwater, principles of the design of composite breakwaters, wave force calculation for composite breakwater, design of breakwater caissons.

Learning Outcomes (LOs): On successful completion of this unit, students should be able to:

1: Demonstrate an understanding of the harmonic analysis of tides;
2: Analyze harbor resonance for free and forced oscillations in closed basin and model the phenomenon in laboratory;
3: Implementation of statistical methods to solve wave spectra problems;
4: Compare the characteristics of different types of port and harbor structures' layout and design;
5: Design breaks waters applying the required theoretical knowledge.

Teaching-learning Strategy: Class lectures, Case studies, Research papers review etc.

Assessment Strategy: Class Tests, Assignments and Final exam.

Linkage of LO with Assessment Methods & their Weights:

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Learning Outcome	Assessment Methods	Weightage	Remarks
LO 1-2	Class participation and observation	5%	
LO 2-5	Class test/Assignment/Case study /Presentation	25%	
LO 1-5	Final Examination	70%	
Total		**100%**	

Mapping of Learning Outcomes (LOs) and Program Outcomes (POs):

Learning Outcomes (LOs)	Program Outcomes (POs)											
	1	2	3	4	5	6	7	8	9	10	11	12
LO 1	x											
LO 2				x								
LO 3		x										
LO 4							x					
LO 5			x									

Reference Books:

1. Handbook of Port and Harbor Engineering: Gregory P. Tsinker;
2. Design of Marine Facilities: John W. Gaythwaite;
3. Problems and Opportunities in the Design of Entrances to Ports and Harbors: Assembly of Engineering;
4. Port Engineering: Harbor Planning, Breakwaters, and Marine Terminals v. 1: Per Bruun.

Grading System: As per approved grading scale of MIST.

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MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Advanced Marine Transport System

Course Code: NAME 6113

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Rationale: Theoretical course based on the design of marine transport systems and port systems and all the related economic, environmental and safety aspects.

Course Content:

Trade and markets, International trade, Shipping Markets and Cycles, operation research technique used in marine transportation problem, Shipping and the Environment: Tanker Spills, Right Whales, Liner Shipping and Ports: FPSOs, Fast Ferries, Fast Freight Ships, Marine transportation system design, Operation and economics of marine transportation system, Shipping Finance, Risk and Return, Interaction between shipping policy and design of marine transportation and port systems, Effects of market structure on economics and finance, Port performance and performance measures, Safety at sea.

Learning Outcomes (LOs): On successful completion of this unit, students should be able to:

1: Demonstrate an understanding of shipping market and international trade;

2: Investigate the environmental impact of shipping market;

3: Define terminologies related to liner shipping industry and port systems;

4: Analyze the design, operation and economic aspects of marine transport system;

5: Evaluate shipping policy and understand port systems and performance;

6: Apply the knowledge for safety at sea;

Teaching-learning Strategy: Class lectures, Case studies, Industry evaluation etc.

Assessment Strategy: Class tests, Assignments and Final exam.

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মিরপুর সেনানিবাস, ঢাকা-১২১৬

Linkage of LO with Assessment Methods & their Weights:

Learning Outcome	Assessment Methods	Weightage	Remarks
LO 1-2	Class participation and observation	5%	
LO 2-6	Home work/Class test/Assignment/Case study /Presentation	25%	
LO 1-6	Final Examination	70%	
Total		**100%**	

Mapping of Learning Outcomes (LO) and Program Outcomes (PO):

Learning Outcomes (LOs) of this course	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
LO 1	x											
LO 2							x					
LO 3	x											
LO 4		x										
LO 5				x								
LO 6						x						

Reference Books:

1. Marine Transportation Management: Henry S. Marcus;
2. Marine Transportation Management (Routledge Library Editions: Transport Economics);
3. Transport Systems and Processes: Marine Navigation and Safety of Sea Transportation: Adam Weintrit and Tomasz Neuman;
4. Stopford, Martin (2009) Maritime Economics, 3rd Edition;
5. Rodrigue, Jean-Paul et al. (2006) The Geography of Transport Systems;
6. Muller, Gerhardt (2000) Intermodal Freight Transportation, 4th Edition.

Grading system: As per approved grading scale of MIST.

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MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Advanced Inland Water Transportation System

Course Code: NAME 6115

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Rationale: Theoretical course based on the study of inland navigation networks and water transportation system.

Course Content:

Inland Navigation Network: Division of Waterways: Worldwide Inland Navigation Network, Historical Development of Inland Navigation Network of Europe, Types of European Waterways, Main European Waterways, Classification of Waterways according to AGN, the Current State of Inland Navigation Network of the European Waterways, Inland Waterway Characteristics: Basic Parameters of Fairway and Hydro Technical Works, Tributaries and Canals.

Inland Water Transport: Development of Inland Navigation Vessels, Type of Vessels, Importance and Performance of Inland Water Transport in ECE Region, the Characteristics of EU Inland Waterway Freight Transport, the Institutional and Regulatory Framework for Inland Navigation in Europe, A pan-European Vision for Efficient and Sustainable Inland Water Transport.

IWT in The Netherlands: Importance of IWT in the Overall Freight Transport System, Historical Development and Present characteristics of the IWT System, Effects of Present IWT Policies on the Development of the IWT System, Interaction of the IWT with Other User Functions of the Water System.

Inland Ports: Definition of Inland Ports, Classification of Inland Ports, Division of Inland Ports, Basic Parts of Inland Ports, Role of Inland Ports in the Transport System, Functions of Inland Ports, Inland River ports of Bangladesh.

Concepts and Accuracy of Navigation: Navigation Methods, Phases of Navigation, Aids to Navigation, Visual Aids, Aids to Navigation Lights, Other aids, E-Navigation, Technical Navigation Equipment of the Ship, Maneuvering Characteristics of Different Types of Inland Waterway Vessels, Maneuvering in Shallow and Confined Water, Climate Change and Navigation, Environmental Impact Assessment.

Inland Waterways & Ports of Bangladesh: Introduction and Sector History, Inland Waterway System, Present Status of IW Networks and Transports, Organizational Structure, Government Policies and Strategies, Future Outlook and Challenges

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কর্ড টু ইন্সপেক্টর অব কলেজেস্
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মিরপুর সেনানিবাস, ঢাকা-১২১৬

Learning Outcomes (LOs): On successful completion of this unit, students should be able to:

1. Explain the pattern of inland water transportation.
2. Develop network system for inland water.
3. Identify the suitable vessels and their characteristics for inland transportation.
4. Design of the suitable vessels for inland transportation.
5. Develop plans on the modes and special regulations of inland water transportation.

Teaching-learning Strategy: Class lectures, Case studies, Industry evaluation etc.

Assessment Strategy: Class tests, Assignments and Final exam.

Linkage of LO with Assessment Methods & their Weights:

Learning Outcome	Assessment Methods	Weightage	Remarks
LO 1	Class participation and observation Attendance	5%	
LO 1-5	Term Paper/Class test/Assignment/Case study/Presentation	25%	
LO 1-5	Final Examination	70%	
Total		**100%**	

Mapping of Learning Outcomes (LO) and Program Outcomes (PO):

Learning Outcomes (LOs) of this course	Program Outcomes (POs)											
	1	2	3	4	5	6	7	8	9	10	11	12
LO 1	x											
LO 2		x										
LO 3			x									
LO 4							x					
LO 5							x					

Reference Books:

1. Inland Waterway Transport: Challenges and Prospects by Bart Wiegmans and Rob Konnings;
2. White Paper on Efficient and Sustainable Development of Inland Water Transport in Europe, UNECE, 2011;
3. A Brief History of Inland Navigation and Waterways, Ministry of Transport, Public Works and water Management, The Netherlands;
4. UNECE Resolutions & CCNR Regulations;
5. Inland Shipping Ordinance, 1976 (Ordinance No. LXXII of 1976) and IWT Master Plan;
6. European Policy for the Promotion of Inland Waterway Transport – A Case Study of the Danube River: By Svetlana Dj. Mihic and Aleksandar Andrejevic;
7. Bangladesh Delta Plan 2100- Sustainable Transportation and Infrastructures – Inland Waterways and Ports, Planning Commission.

Grading system: As per approved grading scale of MIST.

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Vibration and Noises in Marine Structures

Course Code: NAME 6117

Level: Post-graduation programme

Credit Hour: Three (3.00)

Contact Hour: Three (3.00) per week

Rationale: Theoretical course based on the development of mathematical models and solution methods to study vibration and noise of the mechanical systems.

Course Content:

Vibrations: Single degree of freedom system; Coupled two mass systems; Energy methods; Forced vibrations; Different types of damping; Vibration isolation; Multi-degree of freedom systems (Two and three degrees) of vibrations and issues for their application and controls; Effects of couple modes; Shock loading, Vibrational modes of continuous systems.

Noises: Sound generation and propagation mechanisms; Sound field characterization. Sound propagation in ducts; Silencers: Principles and design of silencers.

Systemic approach to noise control: Noise control at source; Noise control along path; Noise control at the receiver. Sound control materials: absorber, barrier and damper.

Flow induced noise and vibration in pipes: Noise generation, transmission and radiation; Noise control techniques.

Noise measurement: Equipment and procedure, impedance, power, intensity, directivity, microphones, sound intensity probes, sound level meters, sound dose meters, frequency analyzers. Human response to noise: Hearing mechanism; Hearing loss and protection; Noise regulations.

Vibration induced in ship structure due to wave, propeller and machinery: Free and forced vibration of single, two and multi-degree of freedom systems. Transverse vibration of beams. Added mass of hull girder vibration. Empirical formulae for calculating hull frequencies. Tensional, flexural and longitudinal vibrations of propeller shafting system. Measurement of ship vibration. Allowable limits of vibration in a ship. Consequences of vibration in different types of vessels. Reduction of vibration by propeller and machinery selection, suppression, isolation and insulation.

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মিরপুর সেনানিবাস, ঢাকা-১২১৬

Learning Outcomes (LOs): On successful completion of this course, student should be able to:

1. Interpret the behavior of vibrating systems through an understanding of basic principles and the role of mass, stiffness and damping

2. Select appropriate techniques for the solution of analytical problems in vibrations.

3. Perform computer simulations employing time integration and modal analysis of discrete vibrating systems.

4. Make relation between ship motion and ship hull vibration.

Teaching-learning Strategy: Class lectures, Class Evaluation etc.

Assessment Strategy: Class tests, exercise, Assignments and Final Exam.

Linkage of LO with Assessment Methods & their Weights:

Learning Outcome	Assessment Methods	Weightage	Remarks
LO 1	Class participation and observation & Attendance	5%	
LO 1-4	Home Work/Class test/Assignment/Case study /Presentation	25%	
LO 1-4	Final Examination	70%	
Total		**100%**	

Mapping of Course LO and Program Outcomes (PO):

Learning Outcomes (LOs) of this course	Program Outcomes (POs)											
	1	2	3	4	5	6	7	8	9	10	11	12
LO 1		x										
LO 2			x									
LO 3					x							
LO 4	x											

Reference Books:

1. Mechanical Vibrations: Theory and Applications – S. G. Kelly;
2. Advanced Vibration Analysis – G. Kelly and O. Akron;
3. Theory of Vibration – Thomson.
4. Mechanical vibration and noise control- Shadhu singh
5. Mechanical vibration- VP Singh
6. Ship Hull Vibration, F.H. Todd, First Edition 1961, Edward Arnold Publishers Ltd.

Grading system: As per approved grading scale of MIST

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MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Offshore Drilling and Subsea Engineering

Course Code: NAME 6119

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Rationale: Theoretical course based on advanced level of offshore engineering to understand the bottoms founded, anchored, and dynamically positioned rigs and their applications.

Course Content:

Basic Petroleum Geology, Offshore Well Construction Process, Drilling Rig Components and their Functions, Types and description of Bottom Founded Offshore Rigs, Drilling a Well from a Bottom Founded Rig, Drill Bits, Drilling Fluids, Casing and Cementing, Evaluation, Offshore Drilling from a Floating Rig (Drill ships, Semisubmersibles), Anchoring, Dynamic Positioning, Motion Compensation, Subsea BOPs (blowout preventer), ROVs (remotely operated vehicle), Supply Boats, Personnel Transfer, Completion and Testing, Directional Drilling and Relief Wells, Offshore Production Systems, Offshore Pipelines.

Learning Outcomes (LO): On successful completion of this course unit, students should be able to:

1. Discuss basic geology and petroleum concepts;
2. Describe the stages of planning and drilling a well and list the tools required for each stage;
3. Recognize the types of drilling units in use today;
4. Indicate the components of a drilling rig and their purposes;
5. Identify the types of drilling fluids and their components;
6. Explain the need for casing and cementing a well, and the methods for doing so;
7. Compare the difference between bottoms founded, anchored, and dynamically positioned rigs and their applications;
8. Identify BOP components, their use, and the control systems for surface and subsea BOPs;

Teaching-learning Strategy: Class lectures, Case studies, Industry evaluation etc.

Assessment Strategy: Class tests, Assignments and Final exam.

Minimum Attendance: As per the regulation of MIST.

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Linkage of LO with Assessment Methods:

Learning Outcome	Assessment Methods	Weightage	Remarks
LO 1-3	Class participation and observation	5%	
LO 3-4	Class test/Assignment	10%	
LO 4-6	Case study /Presentation/Oral examination	15%	
LO 1-8	Final Examination	70%	
Total		**100%**	

Mapping of Learning Outcomes (LO) and Program Outcomes (PO):

Learning Outcomes (LOs) of this course	Program Outcomes (POs)											
	1	2	3	4	5	6	7	8	9	10	11	12
LO 1		x										x
LO 2			x									
LO 3					x							
LO 4		x										
LO 5						x						
LO 6												
LO 7					x							
LO 8		x										

Reference Books:

1. Essentials of Offshore Structures: D. V. Reddy;
2. Offshore Geotechnical Engineering: Milutin Srbulov;
3. Dynamics of Offshore Structures: James F. Wilson;
4. An Introduction to Well Control Calculations for Drilling Operations: Dave Cormack;
5. Handbook of Offshore Oil and Gas Operations: Pratima Jauhari.

Grading system: As per approved grading scale of MIST.

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MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Advanced Numerical Analysis

Course Code: NAME 6121

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Rationale: Theoretical course based on advanced level of numerical mathematics to undertake problem solving tools for the application of governing equations and relevant conditions using numerical methods.

Course Content:

Numerical Analysis: Evaluations of determinants, matrix operations; Eigenvalue and eigen-vectors; Solution of algebraic and transcendental equations. Ordinary differential equations: Initial value problems of linear and nonlinear system of equations; Finite-difference technique of solving ordinary differential equations; Multisegement method of solving unstable system of equations. Partial differential equations, finite difference method of solving of both the linear and non-linear partial differential equations.

Computer programming: Solution of application based engineering problems using FORTRAN, C++, MATLAB or any suitable computer programming language to carry out the analysis using modern numerical tools.

Learning Outcomes (LO): On successful completion of this course unit, students should be able to:

1. Present a physical and scientific problem into mathematical expressions in numerical forms;
2. Transform between analytical and numerical mathematical models;
3. Utilize numerical mathematical models already developed for scientific researches;
4. Develop new numerical mathematical models for specific scientific researches;

Teaching-learning Strategy: Class lectures, Case studies, Research papers review, group discussions, presentations etc.

Assessment Strategy: Class tests, Assignments, Case study, Presentation and Final exam.

Linkage of LO with Assessment Methods & their Weights:

Learning Outcome	Assessment Methods	Weightage	Remarks
LO 1-2	Class participation and observation	5%	
LO 1-3	Class test/Assignment/Case study /Presentation	25%	
LO 1-4	Final Examination	70%	
Total		**100%**	

Mapping of Course LO and Program Outcomes (PO):

Learning Outcomes (LOs) of this course	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
LO 1		x										x
LO 2			x									
LO 3					x							
LO 4		x			x							

Reference Books:

1. Applied Numerical Analysis – G. Wheatley;
2. Theoretical Numerical Analysis: Introduction to Advanced Techniques – Peter Linz;
3. Numerical Methods Using MATLAB – Mathews and Fink;
4. Numerical Methods for Engineers – Chapra and Canale

Grading system: As per approved grading scale of MIST

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মিরপুর সেনানিবাস, ঢাকা-১২১৬

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Allocated for addition of relevant subject

Course Code: NAME 6123

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Course Content:

The content of this course will remain open for the suitable faculty member in accordance with his specialization in the relevant field. Once specialized teacher in the relevant field proposes the course content will be placed to the BPGS of the department for approval.

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MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Allocated for addition of relevant subject

Course Code: NAME 6125

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Course Content:

The content of this course will remain open for the suitable faculty member in accordance with his specialization in the relevant field. Once specialized teacher in the relevant field proposes the course content will be placed to the BPGS of the department for approval.

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মিরপুর সেনানিবাস, ঢাকা-১২১৬

COURSES RELATED TO SHIP DESIGN AND SHIP STRUCTURE

কাজী ওমর বায়েজীদ
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কর্ড টু ইন্সপেক্টর অব কলেজেস্
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মিরপুর সেনানিবাস, ঢাকা-১২১৬

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Applied Ship Design

Course Code: NAME 6201

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Rationale: Theoretical course based on advanced design of different types of Marine Crafts.

Course Content:

Overview of ship design: Ship design philosophy, Design concepts, Mathematical methods for ship form design, Form parameter approach, Line distortion approach, Standard series approach.

Analysis of ship design constraints such as Physical constraints, regulatory constraints, economical constraints etc. and ways to address those constraints. Option analysis of mono, catamaran and trimaran hull, and their co-relation with design constraints.

Design of high speed ships, Advanced ship design and pollution prevention, Contemporary issues in ship design and latest advancement of ship design tools, use of classification society in ship design.

Learning Outcomes (LO): On successful completion of this unit, students should be able to:

1. Analyze the mathematical method of different ship form design;
2. Compare the characteristics of the design features of different ships;
3. Analyze different type of ship design constraints;
4. Apply the knowledge in practical ship designs and constructions;
5. Develop method of designing high speed craft;

Teaching-learning Strategy: Class lectures, Case studies, Industry evaluation etc.

Assessment Strategy: Class tests, Assignments and Final exam.

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মিরপুর সেনানিবাস, ঢাকা-১২১৬

Linkage of LO with Assessment Methods & their Weights:

Learning Outcome	Assessment Methods	Weightage	Remarks
LO 2	Class participation and observation	5%	
LO 1-3	Home Work/Class test/Assignment/Case study /Presentation	25%	
LO 1-5	Final Examination	70%	
Total		**100%**	

Mapping of Learning Outcomes (LO) and Program Outcomes (PO):

Learning Outcomes (LOs) of this course	**Program Outcomes (POs)**											
	1	2	3	4	5	6	7	8	9	10	11	12
LO 1		x										
LO 2	x											
LO 3	x											
LO 4					x							
LO 5			x									

Reference Books:

1. Ship Design for Efficiency and Economy – H. Schneekluth and V. Bertram;
2. Computational Ship Design – Myung-Il Roh, Kyu-Yeul Lee;
3. Advanced Ship Design for Pollution Prevention – Carlos Guedes Soares, Joško Parunov;
4. Risk-Based Ship Design: Methods, Tools and Applications – Carlos Guedes Soares, Andrzej Jasionowski, Jørgen Jensen.

Grading system: As per approved grading scale of MIST.

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মিরপুর সেনানিবাস, ঢাকা-১২১৬

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Advanced Ship Structure

Course Code: NAME 6203

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Rationale: Theoretical course based on advanced level of structure to develop a systematic ship structural design procedure, analysis and applications

Course Content:

Fundamental of both linear and non-linear structural response analysis; ship frame/girder analysis and grillage analysis; elastic responses of grillages; plastic theory and its application to beams and grillages, elastic plate theory; plate behaviour under lateral pressure, elasto-Plastic bending of plate; elastic membrane theory; plate of rupture, elastic buckling behaviour of plates; effective width and long plate strength; wide plate strength; interaction equation, composite materials, introduction to structural dynamics; flexural vibration of beams; flexural vibration of plates; design considerations and criteria for limiting vibrations.

Learning Outcomes (LO): On successful completion of this course unit, students should be able to:

1. Describe the nature of ship hull structures, the role of various components and ship structural design issues;
2. Explain load action and its effects at local and global level;
3. Analyses the global response of surface ships;
4. Solvethe basics of ship hull girder analysis at a local level;
5. Develop a systematic ship structural design procedure at a global level.

Teaching-learning Strategy: Class lectures, Case studies, Research papers review etc.

Assessment Strategy: Class tests, Assignments, Presentation and Final exam.

Linkage of LO with Assessment Methods & their Weights:

Learning Outcome	Assessment Methods	Weightage	Remarks
LO 1-2	Class participation and observation	5%	
LO 2-4	Class test/Assignment	15%	
LO 2-5	Case study /Presentation/Oral examination	10%	
LO 1-5	Final Examination	70%	
Total		**100%**	

Mapping of Learning Outcomes (LO) and Program Outcomes (PO):

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Learning Outcomes (LOs) of this course	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
LO 1												x
LO 2			x									
LO 3					x							
LO 4		x										
LO 5						x						

Reference Books:

1. The Principles of Naval Architecture Series (Strength of Ships and Ocean Structures);
2. Design of Ship Hull Structures (A Practical Guide for Engineers): Springer;
3. Theory and Analysis of Elastic Plates and Shells;
4. Fracture Mechanics: T.L. Anderson.

Grading system: As per approved grading scale of MIST

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মিরপুর সেনানিবাস, ঢাকা-১২১৬

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Finite Element Method for Ship Structure

Course Code: NAME 6205

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Rationale: Theoretical course based on advanced level of mathematics to analyses of complex structures using the finite element method

Course Content:

Equations of Elastic Theory, Overview of Standard Computational Approaches; Vibrational and Residual Methods; Principle of Minimum Potential Energy, Principle of Virtual Work, Finite Element Modelling: Discretization Schemes, Elements and Shape Functions, Derivation of Element Matrices and Vectors, Assembly of Element Matrices and Vectors, Solution of Finite Element Equations; Design of Elements: Plane Problems of Elasticity, Three-Dimensional and Axisymmetric Elements, Isoparametric Formulation, Plate, Shell and Vibrating Elements; Complete Finite Element Solution of Engineering Problems.

Learning Outcomes (LO): On successful completion of this course unit, students should be able to:

1. Predict deformation and stress analyses of complex structures using the finite element method;
2. Analyze nonlinear and dynamic behavior;
3. Conduct a critical assessment of the results;
4. Describe the theoretical basis of the finite element method applied on non-linear and dynamic analysis;
5. Compare the mathematical basis for the description of the behavior of stiffened plates and curved shell structures;
6. Explain the derivation of the incremental stiffness relation for rod and beam elements taking into account the nonlinear behavior due to large deformation and material behavior;
7. Select an element model and calculation method for the analysis of practical problems so that the results are sufficiently accurate.

Teaching-learning Strategy: Class lectures, Case studies, Research papers review etc.

Assessment Strategy: Class tests, Assignments, Presentation and Final exam.

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মিরপুর সেনানিবাস, ঢাকা-১২১৬

Linkage of LO with Assessment Methods & their Weights:

Learning Outcome	Assessment Methods	Weightage	Remarks
LO 1-3	Class participation and observation	5%	
LO 2-4	Class test/Assignment	15%	
LO 4-6	Case study /Presentation/Oral examination	10%	
LO 1-7	Final Examination	70%	
Total		**100%**	

Mapping of Course LO and Program Outcomes (PO):

Learning Outcomes (LO) of this course	Program Outcomes (PO)											
	1	2	3	4	5	6	7	8	9	10	11	12
LO 1												x
LO 2			x									
LO 3					x							
LO 4		x										
LO 5						x						
LO 6			x									
LO 7				x								

Reference Books:

1. A First Course in the Finite Element Method: Daryl L. Logan;
2. Finite Element Analysis: S.S. Bhavikatti;
3. Introduction to Finite Elements in Engineering: Tirupathi R. Chandrupatla, Ashok D. Belegundu.

Grading system: As per approved grading scale of MIST.

কাজী ওমর বায়েজীদ
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কর্ড টু ইন্সপেক্টর অব কলেজেস্
বাংলাদেশ ইউনিভার্সিটি অব প্রফেশনালস্
মিরপুর সেনানিবাস, ঢাকা-১২১৬

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Fracture Mechanics

Course Code: NAME 6207

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Rationale: Theoretical course based on advanced level of structure to analyze the complex structures of fatigue and crack

Course Content:
Introduction and overview; Linear elastic fracture mechanics (LEFM): Modes of fracture failure, stress concentration and singularities, stress intensity factor, stability of crack propagation; Elasto-plastic fracture mechanics: crack tip plasticity, small scale yielding, experimental methods for fracture toughness (KIC) determination, J-integral; R-curves; Fatigue crack growth; Micromechanisms of failure; Post mortem failure analysis.

Learning Outcomes (LO): On successful completion of this course unit, students should be able to:

1. Relate the physical and the mathematical principles of Fracture Mechanics;
2. Identify various applications of this theory to practical problems of structural engineering;
3. Illustrate the mechanics of fracture of brittle and ductile materials and also creep and fatigue fracture;
4. Learn about mechanics of crack tip fields and appropriate fracture characterizing parameters like stress intensity factor and J integral or nonlinear energy release rate;
5. Compare various empirical fatigue crack growth laws, role of stress ratio, overload cycle;
6. Apply the concepts that have learnt to design of structural components taking into account presence of flaws, nature of loading and constitutive behavior of the material;
7. Conduct experiments in the laboratory following standard test procedures to determine the fracture toughness of materials.

Teaching-learning Strategy: Class lectures, Case studies, Research papers review etc.

Assessment Strategy: Class tests, Assignments, Presentation and Final exam.

Linkage of LO with Assessment Methods & their Weights:

Learning Outcome	Assessment Methods	Weightage	Remarks
LO 1-3	Class participation and observation	5%	
LO 2-4	Class test/Assignment	10%	
LO 4-6	Case study /Presentation/Oral examination	15%	
LO 1-7	Final Examination	70%	
Total		**100%**	

Mapping of Learning Outcomes (LO) and Program Outcomes (PO):

Learning Outcomes (LOs) of this course	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
LO 1												x
LO 2			x									
LO 3					x							
LO 4		x										
LO 5						x						
LO 6			x									
LO 7				x								

Reference Books:

1. Fracture Mechanics: Fundamentals and Applications, Anderson, T.L. 3rd Edition, CRC Press Taylor & Francis Gr., 2005, ISBN: 978–1–4200–5821-5;
2. Elementary Engineering Fracture Mechanics, Broek, D, 3rd Edition, Martinus Nijhoff Pub., 1984, ISBN: 90-247-2580-1;
3. Practical Uses of Fracture Mechanics, Broek, D, 3rd Edition, Kluwer Academic Publishers, 1997, ISBN: 90-247-0223-0;
4. Fracture Mechanics: Fundamentals and Applications, Third Edition 3rd Editionby Ted L. Anderson (Author);
5. Fracture Mechanics, Authors: Zehnder, Alan T.

Grading system: As per approved grading scale of MIST

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MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: High Speed Marine Vehicles

Course Code: NAME 6209

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Rationale: Theoretical Course to develop specialization in in the creative design and engineering of high performance leisure and commercial vehicles, including sailing and power yachts, fast ferries, hydrofoils, hovercraft, fishing boats.

Course Content:

Hydrodynamics Design of Planing Hulls: Hydrodynamics of Prismatic Planing Surfaces, Lift of Planing Surfaces, Drag of Planing Surfaces, Drag-Lift Ratio of Planing Surfaces, Center of Pressure of Planing Surfaces, Porpoising Stability Limits.

Inclusion of Whisker Spray Drag in Performance Prediction Method for High-Speed Planing Hulls: Definition of whisker spray and its characteristics, Development of equation for whisker spray drag, Location and design of whisker spray deflectors.

Power and Propeller Requirements for Hard Chine Planing Crafts: Basic elements & bear hull resistance appraisal, Empirical equations and diagrams.

Procedures for Hydrodynamic Evaluation of Planing Hulls in Smooth and Rough Water: Hydrodynamic phenomena related to planning hulls in smooth water, Hull hydrodynamics in planing speed range, Resistance in preplanning range, Behavior of planing boats in a seaway.

The Prediction of Power Performance on Planing Craft: Hydrodynamic Forces on a Planing Hull; Appendage Lift, Drag, and Interference Effects; Propeller Forces; Equilibrium Equations. Semi-Planing Hull

Learning Outcomes (LO): On successful completion of this course, student should be able to:

1. Discuss about different types of high speed vehicles, their typical applications, and their hydrodynamic features.
2. Interpret theoretical and experimental investigations of hydrodynamic properties applied in design of high speed marine vehicles.
3. Analyze and calculate hydrodynamic properties of high speed marine vehicles.
4. Explain the concepts and terminology of high speed marine vehicles

Teaching-learning Strategy: Class lectures, Class Evaluation etc.

Assessment Strategy: Class tests, exercise, Assignments and Final Exam.

Linkage of LO with Assessment Methods & their Weights:

Learning Outcome	Assessment Methods	Weightage	Remarks
LO 1	Class participation, attendance and observation	5%	
LO 1-4	Home Work/Class test/Assignment/Case study /Presentation	25%	
LO 1-4	Final Examination	70%	
Total		**100%**	

Mapping of Course LO and Program Outcomes (PO):

Learning Outcomes (LOs) of this course	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
LO 1	x											
LO 2				x								
LO 3		x										
LO 4	x											

Reference Books:

1. Hydrodynamics of High-Speed Marine Vehicles: Odd M. Faltinsen;
2. High-Speed Marine Craft: Peter J. Mantle;
3. Developments in High-Speed Vehicle Propulsion Systems: S.N.B. Murthy;
4. Jane's High-speed Marine Transportation: Steven Phillips;
5. Hydrodynamic Design of Planing Hulls: Daniel Savitsky.

Grading system: As per approved grading scale of MIST

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MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Advanced Offshore Structures

Course Code: NAME 6211

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Rationale: Theoretical course based on features of various offshore structures, comparison of design of offshore production platforms and analysis of various theories.

Course Content:

Classification of different types of offshore structures and their conceptual designs. Features of Drilling and production rigs, fixed structures, floating structures, complaint structures, linked multi-body systems. Comparison of different designs of offshore production platforms. Analysis of Fundamentals of hydromechanics, Wave theories; Hydrostatic Analysis, Hydrostatic forces and stability of offshore structures; Hydrodynamic Analysis, Wave forces on hydro dynamically transparent structures, Motion of hydro dynamically transparent structures in a seaway, Forces and motions of hydro dynamically compact structures in a seaway.

Learning Outcomes (LO): On successful completion of this unit, students should be able to:

1. Explain terminologies for different types of offshore structures.
2. Identify and differentiate between the types of offshore structure based on their operation and characteristics.
3. Investigate the loads on offshore structures based on design requirements and environmental data.
4. Design and Develop offshore mooring system with safety factors considering operating conditions of the structure.

Teaching-learning Strategy: Class lectures, Case studies, Industry evaluation etc.

Assessment Strategy: Class tests, Assignments and Final exam.

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Linkage of LO with Assessment Methods:

Learning Outcome	Assessment Methods	Weightage	Remarks
LO 1-2	Class test, class participation and observation	5%	
LO 1-3	Term paper, Class Test, Assignment, Case study	25%	
LO 1-4	Final Examination	70%	
Total		**100%**	

Mapping of Course LO and Program Outcomes (PO):

Learning Outcomes (LO) of this course	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
LO 1	x											
LO 2	x											
LO 3		x		x								
LO 4			x									

Reference Books:

1. Offshore Structures (1st Edition - Design, Construction and Maintenance) - Mohamed El-Reedy;

2. Dynamic Analysis and Design of Offshore Structures - Chandrasekaran, Srinivasan;

3. Offshore Structures (Volume I: Conceptual Design and Hydromechanics) - Clauss, Günther, Lehmann, Eike, Östergaard, Carsten;

4. Introduction to offshore structures: design, fabrication, installation, Author William J. Graff.

Grading system: As per approved grading scale of MIST.

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MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Advanced Theory of Resistance and Propulsion

Course Code: NAME 6213

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Rationale: Theoretical Course based on the advanced concepts related to ship resistance and its components, theories related to marine propulsions and propeller design methods.

Course Content:

Experimental determination of ship resistance components: Momentum analysis of flow around hull: leading to wave pattern, viscous and induced resistance components. Wave resistance from wave pattern measurements, methods of wave analysis. Total viscous resistance by wake traverse. Measurement of resistance due to surface shear stress. Measurement of pressure drag. Use of the various experimental techniques to derive form factors.

On-going work of the International Towing Tank Conference Wake: Origins, methods of measurement, detailed wake surveys, mean wake and radial distribution; wake scale effects. Tangential wake components; influence on blade velocity diagram. Influence of tangential wake variations on propeller loading.

Computational and Theoretical approaches: Theoretical predictions of wave resistance and comparisons with experiment. Application of CFD to free surface ship self-propulsion. Thin ship, RANS and volume of fluid. Momentum sources and blade element. Outline descriptions of recent developments in modelling wake and viscous resistance. Theoretical approach to propeller design: Review of theoretical approaches to propeller design including lifting surface approaches, panel methods and blade-element-momentum theories. Development of blade-element-momentum theory in some detail; Goldstein correction factors. Flow curvature effects and corrections to section design. Optimum radial loading. Wake adapted propellers. Water jet efficiency. Design examples using blade-element-momentum theory. Cavitation. Erosion.

Learning Outcomes (LO): On successful completion of this course, student should be able to:

1. Identify the components of ship resistance.
2. Calculate the frictional and residual resistance
3. Perform 2D and 3D extrapolation using ITTC methods.
4. Identify geometric parameters of a propeller.
5. Calculate cavitation and relevant characteristics.

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Teaching-learning Strategy: Class lectures, Class Evaluation etc.

Assessment Strategy: Class tests, exercise, Assignments and Final Exam.

Linkage of LO with Assessment Methods & their Weights:

Learning Outcome	Assessment Methods	Weightage	Remarks
LO 1	Class participation, attendance and observation	5%	
LO 1-5	Home Work/Class test/Assignment/Case study /Presentation	25%	
LO 1-5	Final Examination	70%	
	Total	**100%**	

Mapping of Course LO and Program Outcomes (PO):

Learning Outcomes (LOs) of this course	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
LO 1				x								
LO 2			x									
LO 3		x										
LO 4				x								
LO 5		x										

Reference Books:

1. Resistance and Propulsion of Ships, Sv. A. Harvald, John Wiley & Sons Publication, 1983;

2. Ship Resistance and Propulsion, Anthony F Molland, Stephen R. Turnock, Dominick A Hudson, Cambridge Univeristy Press, 2011;

3. Fundamentals of Ship Resistance and Propulsion, A.J.W. Lap, J.D.V. Manen;

4. Principles of Naval Architecture, Vol.2 Resistance and Propulsion, Society of Naval Architects & Marine Engineers, 1988.

Grading system: As per approved grading scale of MIST

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MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Allocated for addition of relevant subject

Course Code: NAME 6215

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Course Content:

The content of this course will remain open for the suitable faculty member in accordance with his specialization in the relevant field. Once specialized teacher in the relevant field proposes the course content will be placed to the BPGS of the department for approval.

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COURSES RELATED TO MARINE ENGINEERING

কাজী ওমর বায়েজীদ
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MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Advanced Marine Engineering

Course Code: NAME 301

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Rationale: Theoretical course based on application and understanding of various marine machineries and their mechanism.

Course Content:

Propulsion Machinery: Orientation with latest propulsion machinery, Different means of propulsion powers including AIP, Selection criteria and procedure of main machinery and auxiliaries.

Special Propulsive Devices: Ducted propeller, Contra Rotating propeller, Controllable pitch propeller, Surface piercing propeller etc.

Analysis of Engine-Propeller matching, Design of marine transmission devices: Spur, helical, bevel, worm gears and wheel systems. Detailed assessment of Spur, Helical Cross-Axial Helical, Bevel Worm and Wheel systems, Principles of engagement, Generation analytical geometry, Measurement and detailed specification.

Marine Tribology: Friction, Lubrication and cooling, Wear characteristics. Design and operation of clutch/coupling. Hydraulic and Pneumatic system machinery. Marine Controls and monitoring systems.

Learning Outcomes (LO): On successful completion of this unit, students should be able to:

1. Analyze the working aspects of different types of engine and gas turbine;
2. Evaluate the different types of special features of various types of marine engine and gas turbine;
3. Analyze the Engine-Propeller matching and Design of marine transmission devices
4. Make decision for suitable engine selection, their operation and shafting arrangement;
5. Demonstrate understanding and implementation of the mathematical concepts of Marine Engine related calculations.

Teaching-learning Strategy: Class lectures, Case studies, Industry evaluation etc.

Assessment Strategy Class tests, Assignments and Final exam.

Linkage of LO with Assessment Methods & their Weights:

Learning Outcome	Assessment Methods	Weightage	Remarks
LO 1-2	Class participation and observation	5%	
LO 1-3	Class test/Assignment/Case study /Presentation	25%	
LO 1-5	Final Examination	70%	
Total		**100%**	

Mapping of Learning Outcomes (LO) and Program Outcomes (PO):

Learning Outcomes (LOs)	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
LO 1	x											
LO 2		x										
LO 3					x							
LO 4				x								
LO 5		x										

Reference Books:

1. Advanced Marine Engineering Knowledge – V. Gokhale and N. Nanda;
2. Naval Marine Engineering Practice – Anan (Navy Dept);
3. General Engineering Knowledge for Marine Engineers – L. Jackson and T. D. Morton;
4. Motor Engineering Knowledge for Marine Engineers – L. Jackson, T. D. Morton and A. Price;
5. Tribology – B Bhushan.

Grading system: As per approved grading scale of MIST.

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MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Marine Instrumentation and Controls

Course Code: NAME 6303

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Rationale: Theoretical course based on advanced level of understanding for marine machinery controls and monitoring to undertake the operations and maintenance works with due confidence as a marine engineer.

Course Content:

Introduction to System Analysis: Formation of Mathematical Models to study System behaviour considered in a mathematics sense using Differential Equation. System description using mathematical terms for Mechanical, Electrical, Thermal and Liquid Level system, use of Laplace Transforms, Transfer Functions and Blocks Diagrams for Solving control system problems. Flowchart for automation & control system – depiction and understanding of flowchart, symbols utilisation and processes involved. Use of D-Operators, Concept of stability. Routh & Hurwitz stability criteria. Analysis of system Performance under dynamic or transient operating condition using Laplace Transformers. Performance characteristics. Nyquist stability criterion, System performance and compensation.

Automatic Controllers: Functions of a Proportional, Integral and Derivative, Action Controllers, Stacked Type, Electronics, and Pulse type Controllers, Controller Adjustments, Relays On –Off /Cut Off Switches, System analysis of all these control systems, formation of mathematical model V-I, I-V, P-I & -I-P converters and Solve numerical problems on all above.

Correcting Units: Detailed study of Diaphragm actuators, Valve – petitioners, piston actuators, electro-pneumatic transducers. Eelctro-hydarulic actuators and Electrics actuator control valve. Signal Transmitting Devices: Flapper Nozzle, Electro Pneumatic signal converter, Electrical signal transmission. Pneumatic, Types of controllers: Hydraulic. Electric and electronics controllers for generation of control action, Variable inductance and capacitance transducer, Force Balance Transducer, Synchros Solving numerical problems on all above.

Application of controls on ships: Marine Boiler –Automatic Combustion control, Air/fuel ratio control, feed water control two and three elements type, steam pressure control, combustion chamber pressure control, fuel oil temperature control, Control in main Machinery units for Temperature of lubricating oil, jacket cooling water , fuel valve cooling water, piston cooling water and scavenge air, fuel oil viscosity control, working of control system during Manoeuvring of Direct Reversing Diesel Engine Bridge control of main machinery. Instrument for UMS classification.

Programmable Logic Controllers, Integrated automation control and monitoring (ICAMS), Computer programmable controller, Relay circuit unit, Digital sequential control devices, Control mechanism of PLC. Software version control -PLC, Micro – Controllers, digital technique.

Learning Outcomes (LO): On successful completion of this course unit, students should be able to:

1. Present a physical system into mathematical expressions to have the control over it;
2. Measure engineering system parameters related to controls and monitoring;
3. Develop programmable logics to control and monitor machines and systems;
4. Apply software based control mechanism on marine machinery;

Teaching-learning Strategy: Class lectures, Case studies, Research papers review, group discussion, presentation etc.

Assessment Strategy: Class tests, Assignments, Presentation, Case study and Final exam.

Linkage of LO with Assessment Methods & their Weights:

Learning Outcome	Assessment Methods	Weightage	Remarks
LO 1-2	Class participation and observation	5%	
LO 1-3	Class test/Assignment/Case study /Presentation	25%	
LO 1-4	Final Examination	70%	
Total		**100%**	

Mapping of Course LO and Program Outcomes (PO):

Learning Outcomes (LOs) of this course	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
LO 1		x										x
LO 2			x									
LO 3				x	x							
LO 4		x		x	x							

Reference Books:

1. Marine Electrical Equipment and Practice – H D McGeorge
2. Practical Marine Electrical Knowledge – Dennis T. Hall
3. The Marine Electrical and Electronics Bible – John C. Payne
4. Advanced Electrotechnology for Marine Engineers – Christopher Lavers, and Edmund G. R. Kraal
5. Advanced Marine Electrics and Electronics Troubleshooting – Edwin R. Sherman
6. Instrumentation and Control Systems – Leslie Jackson

Grading system: As per approved grading scale of MIST

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Submarine Engineering

Course Code: NAME 6305

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Rationale: Theoretical course based on understanding of submarine design, construction, operations and maintenance.

Course Content:

Hydrostatics and Control: Hydrostatics and Displacement, Static Control, Control in the Vertical Plane, Transverse Stability, Longitudinal Stability, Trim and Compensation Ballast Tanks, Trim Polygon, Stability When Surfacing/Diving, Stability When Bottoming.

Manoeuvring and Control: Equations of Motion, Hydrodynamic Forces—Steady State Assumption, Determination of Coefficients, Model Tests, Computational Fluid Dynamics, Approximation Techniques, Alternative Approach to Simulation of Manoeuvring, Manoeuvring in the Vertical Plane, Manoeuvring in the Horizontal Plane, Manoeuvring Criteria, Manoeuvring Limitation Diagrams, Flooding, Operating Constraints, Submarine Manoeuvring Trials.

Resistance and Propulsion: Components of Resistance, Effect of Hull Form, Fore Body Shape, Parallel Middle Body, Aft Body Shape, Prediction of Submarine Resistance, Propulsor/Hull Interactions, Axisymmetric Hull with Single Propeller/ Pumpjet, Contra-rotating Propulsion and other propulsions.

Propulsion Power: Diesel electric, Closed Cycle Diesel (CCD) Engines, Closed Cycle Steam Turbines (CCST), Sterling Cycle Engines, Fuel Cells and Nuclear Power.

Learning Outcomes (LO): On successful completion of this course unit, students should be able to:

1. Explain submarines and their peculiarity from all other types of ships or craft;
2. Perform the duties of marine engineer onboard submarine;
3. Undertake maintenance and repair works as shipyard engineer;
4. Perform as submarine construction engineer;
5. Undertake submarine propulsion system modification projects.

Teaching-learning Strategy: Class lectures, Case studies, Research papers review etc.

Assessment Strategy: Class tests, Assignments, Presentation and Final exam.

Linkage of LO with Assessment Methods & their Weights:

Learning Outcome	Assessment Methods	Weightage	Remarks
LO 1-3	Class participation and observation	5%	
LO 1-5	Class test/Assignment	15%	
LO 1-5	Case study /Presentation	10%	
LO 1-5	Final Examination	70%	
Total		**100%**	

Mapping of Course LO and Program Outcomes (PO):

Learning Outcomes (LOs) of this course	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
LO 1		x										x
LO 2			x									
LO 3				x	x							
LO 4		x		x	x							
LO 5					x				x			

Reference Books:

1. Submarine Hydrodynamics – Martin Renilson
2. Concepts in Submarine Design – Roy Burcher
3. Submarine Propulsion : Muscle Power to Nuclear – Anil Anand

Grading system: As per approved grading scale of MIST

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MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Marine Nuclear Power Engineering

Course Code: NAME 6307

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Rationale: Theoretical course based on understanding of construction, operations and maintenance nuclear power plants used in marine fields.

Course Content:

Nuclear Reactor Theory and Application: Neutron, Neutron Nuclear Reactions, Nuclear Fission, Nuclear Structure and Nuclear Energy, Nuclear Reactors, Their types and Structures, Reactor Construction, Time-dependent Change of a Reactor and its Control, Burn-up, Fuel Management, Fuel Cycle, Characteristics and construction of marine nuclear plants, Advances in nuclear technology.

Reactor Analysis: Neutron Density and Flux, Neutron Transport Equation, Slowing-down of Neutrons, Neutron Diffusion, Discretization of Diffusion Equation, Solution of Diffusion Equation, Safety and security analysis.

Learning Outcomes (LO): On successful completion of this course unit, students should be able to:

1. Explain nuclear power plant in overall perspective;
2. Demonstrate the mechanism marine nuclear power plants;
3. Perform the duties of a marine engineer onboard nuclear propelled vessels;
4. Undertake nuclear power propulsion system modification projects;
5. Ensure safety issues for nuclear plant operations.

Teaching-learning Strategy: Class lectures, Case studies, Research papers review etc.

Assessment Strategy: Class tests, Assignments, Presentation and Final exam.

কাজী ওমর বায়েজীদ
মেজর
কর্ড টু ইন্সপেক্টর অব কলেজেস
বাংলাদেশ ইউনিভার্সিটি অব প্রফেশনালস্
মিরপুর সেনানিবাস, ঢাকা-১২১৬

Linkage of LO with Assessment Methods & their Weights:

Learning Outcome	Assessment Methods	Weightage	Remarks
LO 1-2	Class participation and observation	5%	
LO 1-5	Class test/Assignment/Case study /Presentation	25%	
LO 1-5	Final Examination	70%	
Total		**100%**	

Mapping of Course LO and Program Outcomes (PO):

Learning Outcomes (LOs) of this course	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
LO 1	x	x										
LO 2			x			x						
LO 3				x	x				x			
LO 4		x		x	x							
LO 5						x			x			

Reference Books:

1. Nuclear Engineering Fundamentals: A Practical Perspective – Robert E. Masterson
2. An Introduction to Nuclear Power Generation – Christopher E. Brennen
3. Nuclear Engineering and Technology (NET) – An international journal of the Korean Nuclear Society
4. Nuclear Reactor Theory – Hiroshi Sekimoto
5. Submarine Hydrodynamics – Martin Renilson
6. Submarine Propulsion : Muscle Power to Nuclear – Anil Anand

Grading system: As per approved grading scale of MIST

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MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Allocated for addition of relevant subject

Course Code: NAME 6309

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Course Content:

The content of this course will remain open for the suitable faculty member in accordance with his specialization in the relevant field. Once specialized teacher in the relevant field proposes the course content will be placed to the BPGS of the department for approval.

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মিরপুর সেনানিবাস, ঢাকা-১২১৬

COURSES RELATED TO MARINE HYDRODYNAMICS

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MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Advanced Theory of Hydrodynamics

Course Code: NAME 6401

Level: Post-graduation programme

Credit Hour: 3.00

Contact Hour: Three (3.0) per week

Rationale: Theoretical Course to promote the knowledge of the students about the characteristics of fluid flow and its implication in the design of Marine Vehicles.

Course Content:

The Motion of a Viscous Fluid: Description of flow, Conservation of Mass and Momentum, Transport Theorem, Continuity Equation, Euler's equation, Stress relations in a Newtonian fluid, Navier-Stokes Equation, Laminar Boundary Layers: Steady Flow past a flat plate, Laminar Boundary Layers: Steady Two dimensional flows, Turbulent Flow: General Aspects, Turbulent Boundary Layer on a flat plate.

The Motion of an Ideal Fluid: Irrotational Flows, The Velocity Potential, Bernoulli's Equations, Boundary Conditions, Simple Potential Flows, The Stream Function, The Complex Potential, Conformal Mapping, Separation of Variables, Green's Theorem and Distribution of Singularities, Hydrodynamics Pressure Forces, Force on a Moving Body in an Unbounded Fluid, General properties of the Added Mass Coefficients, The Body-Mass Force, Force on a Body in Non-uniform Stream.

Lifting Surfaces: Two dimensional Hydrofoil Theory, Linearized Two-dimensional theory, The lifting Problem, Simple Foil Shapes, Drag force on a two-dimensional foil, Two-dimensional Source and Vortex Distributions, Singular Integral Equations, Three dimensional Vortices, Three dimensional planar lifting surfaces, Induced Drag, Lifting line theory, Cavity flows, Symmetric Cavity flows, Super-cavitating Lifting foils, Unsteady Hydrofoil theory.

Hydrodynamics of Slender Bodies: Slender Body in an Unbounded Fluid, Longitudinal Motion, The Lateral Force, Ship Maneuvering: The Hydrodynamic Forces, Ship Maneuvering: The equations of Motion, Slender Bodies in Waves, Strip Theory for Ship Motions, Slender Bodies in Shallow Water.

Learning Outcomes (LO): On successful completion of this course, student should be able to:

1. Describe the flow around bluff and streamlined bodies and discuss the benefits of streamlining,
2. Calculate the pressure distribution and wake field around a submerged body in fluid,
3. Apply fluid flow principles, including conservation of mass, momentum and energy, Bernoulli's principle, the stream and potential functions, and sources and sinks, to assess the forces applied by the flow to submerged bodies in fluid,
4. Estimate the wave-induced loads on simple geometric shapes and find the equations of motions of floating structures like that of ship.

Teaching-learning Strategy: Class lectures, Class Evaluation etc.

Assessment Strategy: Class tests, exercise, Assignments and Final Exam.

Linkage of LO with Assessment Methods & their Weights:

Learning Outcome	Assessment Methods	Weightage	Remarks
LO 1	Class participation, attendance and observation	5%	
LO 1-5	Home Work/Class test/Assignment/Case study /Presentation	25%	
LO 1-5	Final Examination	70%	
	Total	**100%**	

Mapping of Course LO and Program Outcomes (PO):

Learning Outcomes (LOs) of this course	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
LO 1		x										
LO 2					x							
LO 3						x						
LO 4				x								

Reference Books:

1. Marine Hydrodynamics, Newman, John N., MIT Press, 1977;
2. Applied Hydrodynamics, H.R. Valentine, Newnes-Butterworth; Student international edition, 1969;
3. Theoretical Hydrodynamics, Milne-Thomson, 4th edition, 1962;
4. Hydrodynamics of High-Speed Marine Vehicles, ODD M. Faltinsen, Cambridge University Press, 2005.

Grading system: As per approved grading scale of MIST

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মিরপুর সেনানিবাস, ঢাকা-১২১৬

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Mechanics of Water Waves

Course Code: NAME 6403

Level: Post-graduation program

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Rationale: Theoretical course based on wave mechanics and effect of waves on ship motion.

Course Content:

Review of Hydrodynamics: Hydrostatics, Equation of Continuity, Rotational and Irrotational Flows, The Dynamical Equations of Motion, Viscous Flows.

Surface Waves: Small Amplitude Wave Theory, Engineering Wave Properties, Long Waves, Wave Statistics and Spectra, Nonlinear Waves.

Floating Body Dynamics: Linearized Equations of Motions for a Constrained Floating Body, Scattering by a Vertical Cylinder with Circular Cross Section, Diffraction and Radiation of Simple Harmonic Waves, Power Absorption by Floating Bodies, Principles of Calculating the Transient Motion of a Floating Body, Viscous Damping in Small Amplitude Waves.

Effect of Waves on Ship Motion: Two and three dimensional ship waves, the method of stationary phase, Energy radiation and wave resistance, Wave exciting force and moment and characteristics of flow around a ship hull.

Learning Outcomes (LO): On successful completion of this course, students should be able to:

1. Define terminologies for different types of hydrodynamic flows and waves.
2. Identify and differentiate between different types of ship waves, exciting forces and moments.
3. Investigate the loads on floating bodies based on design requirements and environmental data.
4. Design and Develop damping system for dynamic bodies with consideration of operating environment.

Teaching-learning Strategy: Class lectures, Case studies, Industry evaluation etc.

Assessment Strategy: Class tests, Assignments and Final exam.

Linkage of LO with Assessment Methods & their Weights:

Learning Outcome	Assessment Methods	Weightage	Remarks
LO 2-3	Attendance, Class Participation and observation	5%	
LO 1	Class Test	20%	
LO 3	Assignment	5%	
LO 4	Final Exam	70%	
Total		**100%**	

Mapping of Learning Outcomes (LO) and Program Outcomes (PO):

Learning Outcomes (LOs)	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
LO 1	x											
LO 2	x											
LO 3				x								
LO 4			x									

Reference Books:

1. Water Wave Mechanics for Engineering and Scientists, Robert G. Dean & Robert A Dalrymple, Advance Series on Ocean Engineering – Volume 2, World Scientific Publishing Co. Pte. Ltd., 2000.

2. Theory and Application on Ocean Surface Waves, Chiang C. Mei, Michael Stiassnie, Dick K.-P. Yue, World Scientific Publishing Co. Pte. Ltd., 2005.

3. Marine Hydrodynamics, John N. Newman, MIT press, 1977.

Grading system: As per approved grading scale of MIST.

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মিরপুর সেনানিবাস, ঢাকা-১২১৬

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Advanced Computational Fluid Dynamics

Course Code: NAME 6405

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Rationale: Theoretical course based on application of CFD techniques for numerical solution of flow problems and turbulence modeling.

Course Content:

Introduction: Finite difference (FDM) and Finite volume (FVM) methods, elliptic, parabolic and hyperbolic equations, Navier-Stokes (N-S) and energy equations, explicit and implicit methods, higher order schemes Solutions of simultaneous equations: iterative and direct methods, Gauss-Seidel iteration, CGS, Bi-CGSTAB and GMRES (m) matrix solvers, different acceleration techniques; Incompressible flow: N-S equation using explicit methods: MAC and SMAC (staggered and collocated grids), semi-implicit methods: SIMPLE and SIMPLER, projection method, higher order discretization, Compressible Flow: solution of compressible N-S equation, finite volume formulations, geometric flexibility, Jameson's, MacCormack's, Steger and Warming schemes in FVM, flux splitting scheme and upwinding, different acceleration technique, multigrid method; Grid generation: grid generation using algebraic and partial differential equations; N-S equations in irregular geometry: transformation of N-S equation in curvilinear coordinate system, non-orthogonal grid, Uncertainty of numerical results: Sources of uncertainties, independence studies on grid, time-step, domain and initial condition. Turbulence modeling: scales of turbulence, concept of turbulence modeling, different eddy viscosity based models, introduction to large eddy simulation (LES) and direct numerical simulation (DNS).

Learning Outcomes (LO): On successful completion of this unit, students should be able to:

1. Apply finite difference and finite volume methods to fluid flow problems;
2. Describe different methods for numerical solution of flow problems and their applicability for different types of flow;
3. Explain and utilize CFD techniques for solving incompressible and compressible Navier-Stokes (N-S) equation in primitive variables;
4. Explain and apply CFD techniques for grid generation in complex geometry;
5. Explain the uncertainty of results from numerical flow simulations;
6. Apply turbulence models in fluid flow simulation.

Teaching-learning Strategy: Class lectures, Case studies, Industry evaluation etc.

Assessment Strategy: Class tests, Assignments and Final exam.

Linkage of LO with Assessment Methods & their Weights:

Learning Outcome	Assessment Methods	Weightage	Remarks
LO 1-2	Class participation and observation	5%	
LO 1-6	Class test/Assignment/Case study /Presentation	25%	
LO 1-6	Final Examination	70%	
Total		**100%**	

Mapping of Learning Outcomes (LO) and Program Outcomes (PO):

Learning Outcomes (LOs) of this course	Program Outcomes (PO)											
	1	2	3	4	5	6	7	8	9	10	11	12
LO-1	x											
LO-2		x										
LO-3			x									
LO-4	x											
LO-5	x											
LO-6	x											

Reference Books:

1. An Introduction to Computational Fluid Dynamics: The Finite Volume Method, H.K. Versteeg and W Malalasekera, 2 nd edition, Pearson Prentice Hall Editions, 2007;

2. Computational Fluid Dynamics: An Introduction, John F. Wendt, 3 rd edition, Springer Verlag Berlin Heidelberg, 2009;

3. Turbulence Modeling for CFD, David C. Wilcox, 3 rd Edition, DCW publishers, 2006.

Grading system: As per approved grading scale of MIST.

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মিরপুর সেনানিবাস, ঢাকা-

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Hydrodynamic Loading of Floating Body

Course Code: NAME 6407

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Rationale: Theoretical course based on the analysis of water wave theory and calculation of the fluid and wave forces on floating structures.

Course Content:

Overview of fluid mechanics, Linear wave theory, Morrison equation and diffraction theory, Numerical solution of Green function and fluid forces on floating bodies, Governing equation of second order wave drift forces, Wind and current forces and their effects on floating bodies, Response of floating bodies to regular and irregular waves.

Learning Outcomes (LO): On successful completion of this unit, students should be able to:

1. Discuss the fundamentals of hydrodynamics of floating bodies;
2. Demonstrate a comprehensive understanding of linear water wave theories and analyze the kinematics, dynamics and propagation properties of water waves;
3. Assess the applicability of different analytical and empirical approaches in calculating wave and current loads on structures;
4. Concisely formulate the diffraction, radiation, motion and their response of floating bodies in regular and irregular wave.

Teaching-learning Strategy: Class lectures, Case studies, Industry evaluation,

Assessment Strategy: Class tests, Assignments and Final exam.

Linkage of LO with Assessment Methods & their Weights:

Learning Outcome	Assessment Methods	Weightage	Remarks
LO 1-2	Class participation and observation	5%	
LO 1-3	Class test/Assignment/Case study/Presentation	25%	
LO 1-4	Final Examination	70%	
	Total	**100%**	

Mapping of Learning Outcomes (LO) and Program Outcomes (PO):

Learning Outcomes (LOs) of this course	Program Outcomes (PO)											
	1	2	3	4	5	6	7	8	9	10	11	12
LO-1	x											
LO-2		x										
LO-3		x										
LO-4			x									

Reference Books:

1. Practical Ship Hydrodynamics, Second Edition: Volker Bertram;
2. Offshore Hydromechanics: J.M.J. Journée and W.W. Massie;
3. The Physics of Ocean Waves: Michael Twardos;
4. Large Floating Structures: B. T. Wang;
5. Dynamics of Floating Offshore Structures: Subrata K. Chakrabarti.

Grading system: As per approved grading scale of MIST.

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মিরপুর সেনানিবাস, ঢাকা-১২১৬

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Turbulence Modeling

Course Code: NAME 6409

Level: Post-graduation programme

Credit Hour: 3.00

Contact Hour: Three (3.0) per week

Rationale: Theoretical course which will provide a comprehensive grounding in the subject of turbulence modeling and simulations, and develop both the physical insight and the mathematical framework needed to understand turbulence model formulations and their inherent limitations.

Course Content:

Introduction to turbulent flows; Governing equations for turbulent flows, Decomposition and averaging of instantaneous quantities, Velocity correlations, Reynolds-averaged Navier-Stokes (RANS) equations, Turbulent kinetic energy equation, Dissipation rate equation, scalar transport equation, Zero equation models: Algebraic models; eddy viscosity and mixing length hypothesis, Cebeci-Smith and Baldwin-Lomax models, one-and two-equation models, low–Reynolds-number effects, effects of compressibility; Reynolds stress transport equations, Second-order closure models: Reynolds-stress and algebraic stress models, Introduction to large-eddy simulation (LES), detached–eddy simulation (DES) and direct numerical simulation (DNS).

Learning Outcomes (LO): On successful completion of this course, student should be able to:

1. Understand the basic principles behind the transport of momentum, energy and vorticity in turbulent flows
2. Analyze simple shear, wall bounded and boundary layer flows with the use of phenomenological models of turbulence.
3. Apply the classical and modern statistical theories of turbulence to real flow analysis.
4. Appraise results from commercial computational fluid dynamics packages.

Teaching-learning Strategy: Class lectures, Class Evaluation etc.

Assessment Strategy: Class tests, exercise, Assignments and Final Exam.

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মিরপুর সেনানিবাস, ঢাকা-১২১৬

Linkage of LO with Assessment Methods & their Weights:

Learning Outcome	Assessment Methods	Weightage	Remarks
LO 1	Class participation, attendance and observation	5%	
LO 1-5	Home Work/Class test/Assignment/Case study /Presentation	25%	
LO 1-5	Final Examination	70%	
	Total	**100%**	

Mapping of Course LO and Program Outcomes (PO):

Learning Outcomes (LOs) of this course	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
LO 1	x											
LO 2			x									
LO 3					x							
LO 4	x			x								

Minimum Attendance: As per the regulation of MIST

Reference Books:

1. Cebeci, T.: Analysis of Turbulent Flows with Computer Programs, Third Edition, Elsevier Ltd., 2013..

2. Davidson, L.: An Introduction to Turbulence Model, Department of Thermo and Fluid Dynamics, Chalmers University of Technology, Goteborg, Sweden, 2016.

3. Hoffmann, K. A. and Chiang, S. T.: Computational Fluid Dynamics, Vol. III, Engineering Education System, Wichita, USA, 2000.

4. Wilcox, D. C.: Turbulence Modeling for CFD, DCW Industries, Inc., Third Edition, 2006

Grading system: As per approved grading scale of MIST

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Naval Architecture and Marine Engineering

Course Title: Allocated for addition of relevant subject

Course Code: NAME 6411

Level: Post-graduation programme

Credit Hour: Three (3.0)

Contact Hour: Three (3.0) per week

Course Content:

The content of this course will remain open for the suitable faculty member in accordance with his specialization in the relevant field. Once specialized teacher in the relevant field proposes the course content will be placed to the BPGS of the department for approval.

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মিরপুর সেনানিবাস, ঢাকা-১২১৬